

Legend	
	Central Business Zone
	Commerce and Light Manufacturing Zone
	Residential Zone
	Mekong River
	Trunk Route
	Axis of Town
	Port

Fig. 2.7 Schematic Illustration of Urban Structure

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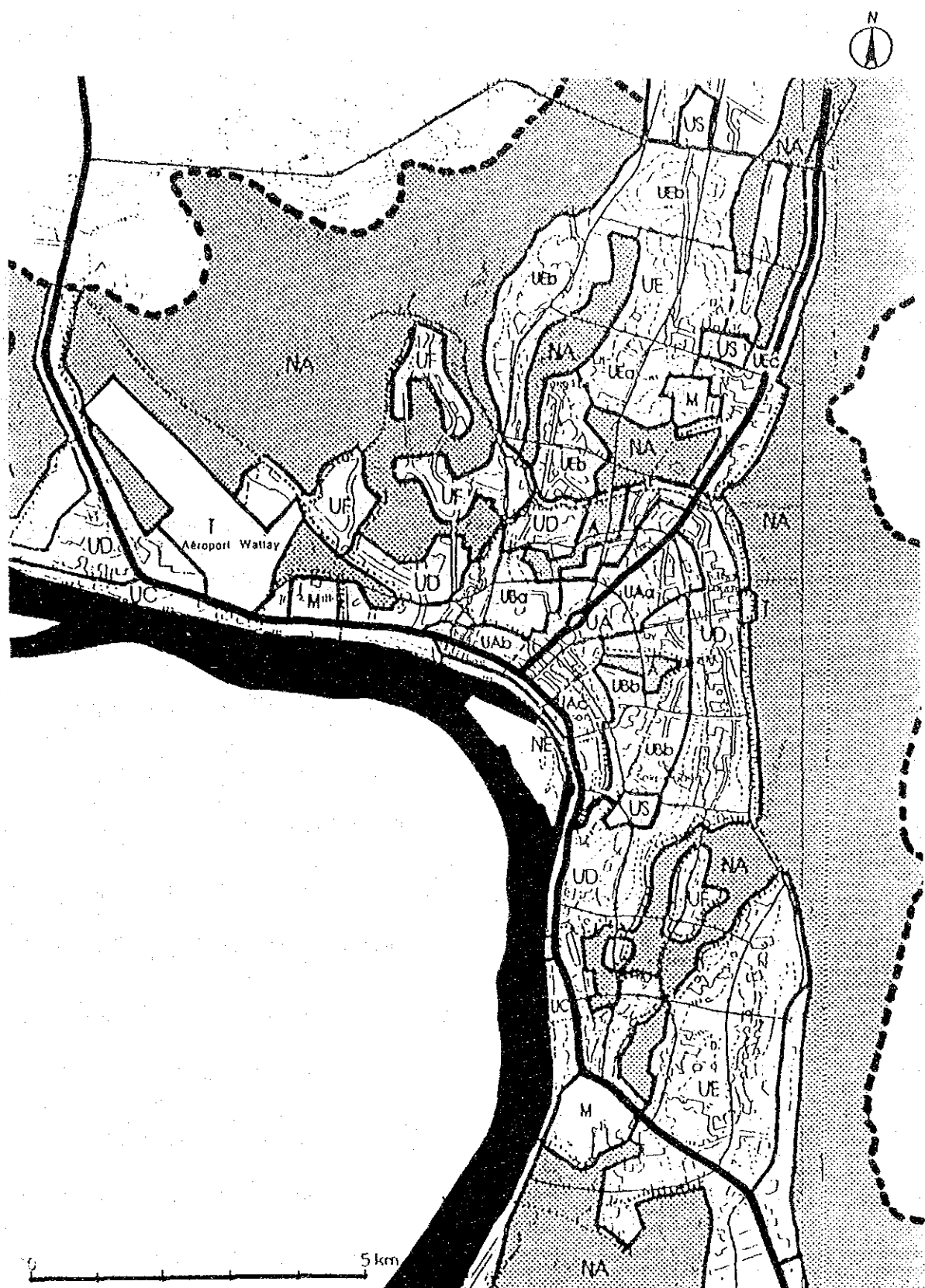


Fig. 2.8 Future Land Use Map (1990 - 2000)
(SOURCE : UNDP)

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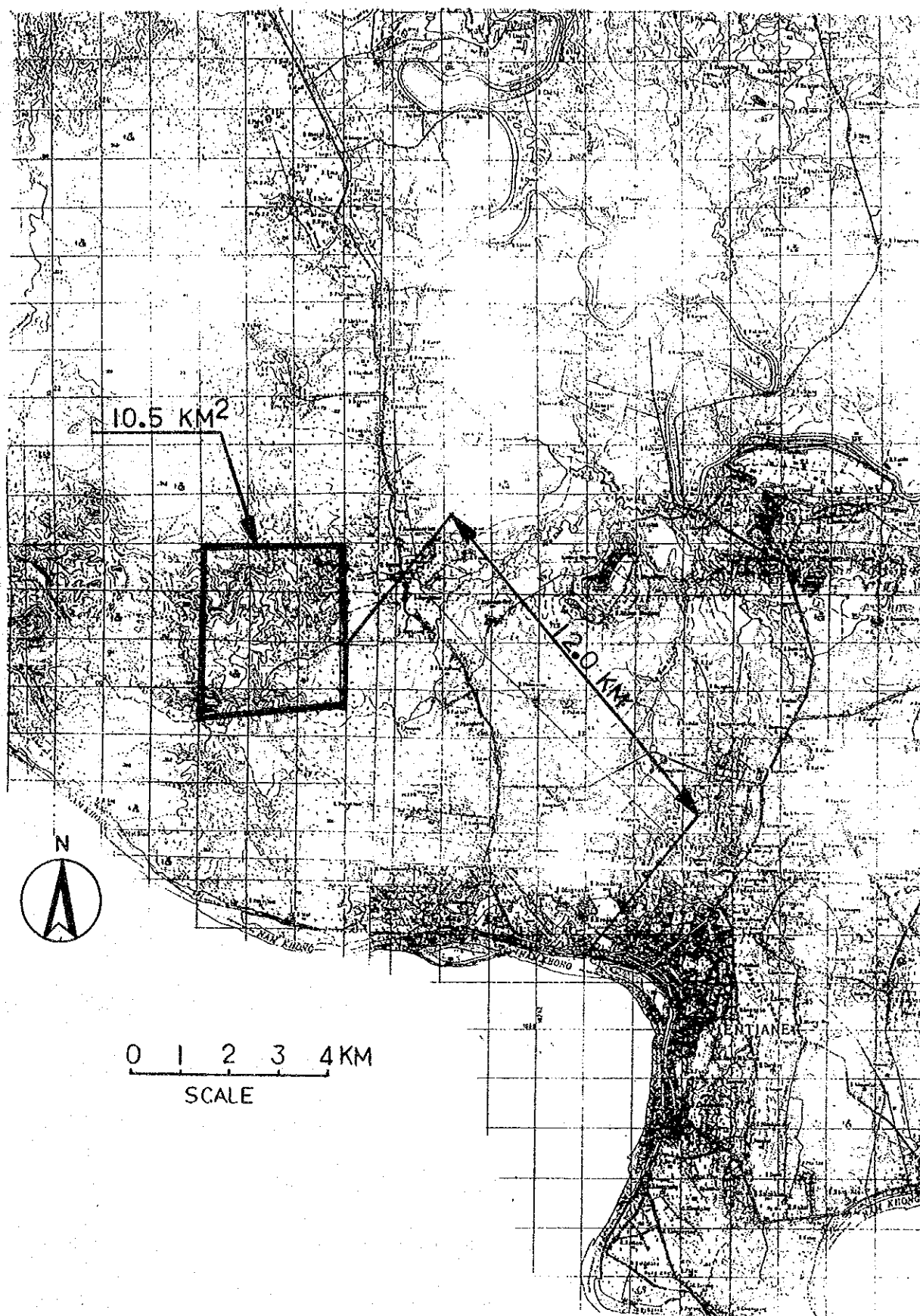


Fig. 2.9

Proposed Borrow Area of Rocks

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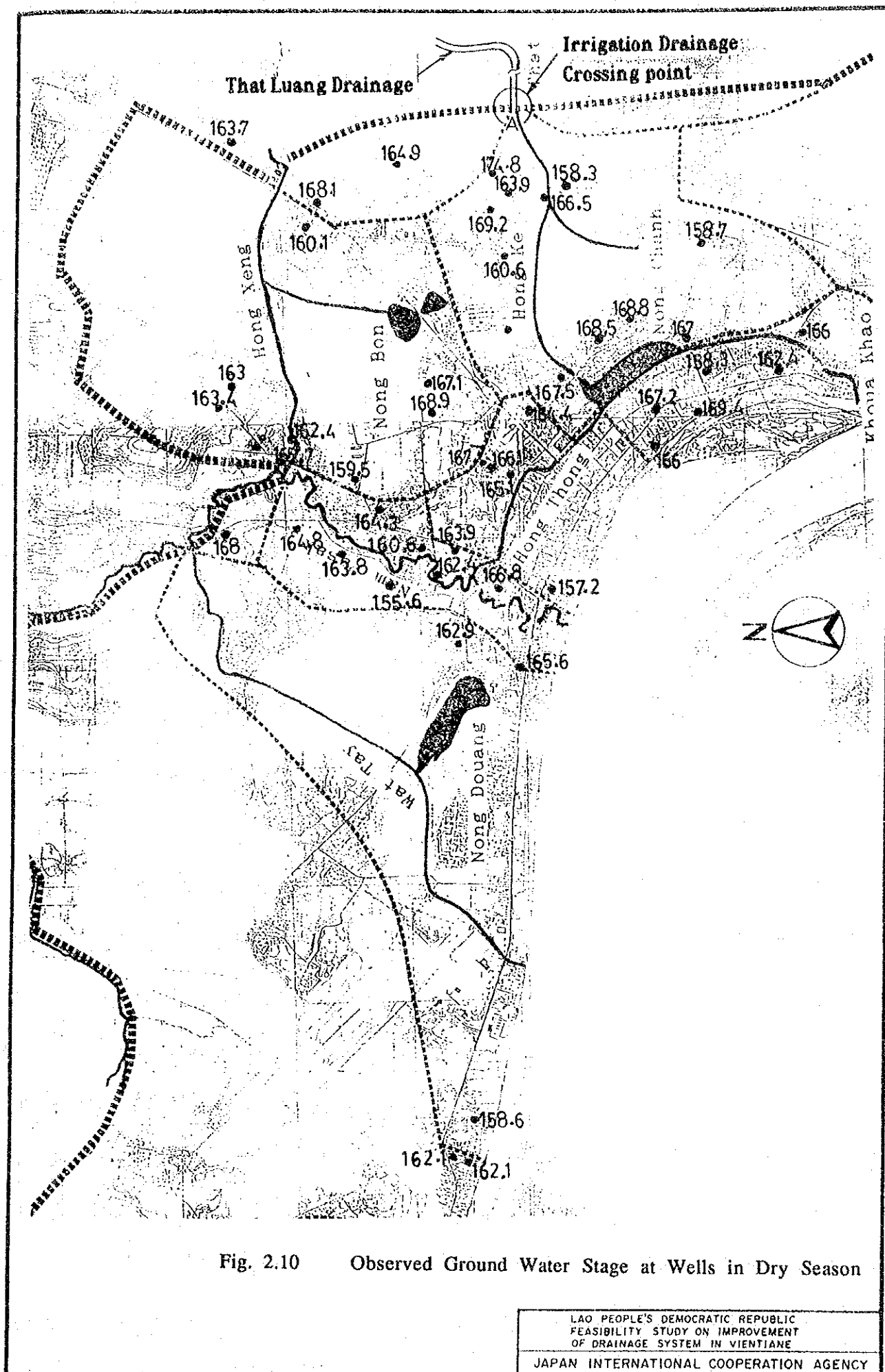


Fig. 2.10 Observed Ground Water Stage at Wells in Dry Season

LAO PEOPLE'S DEMOCRATIC REPUBLIC
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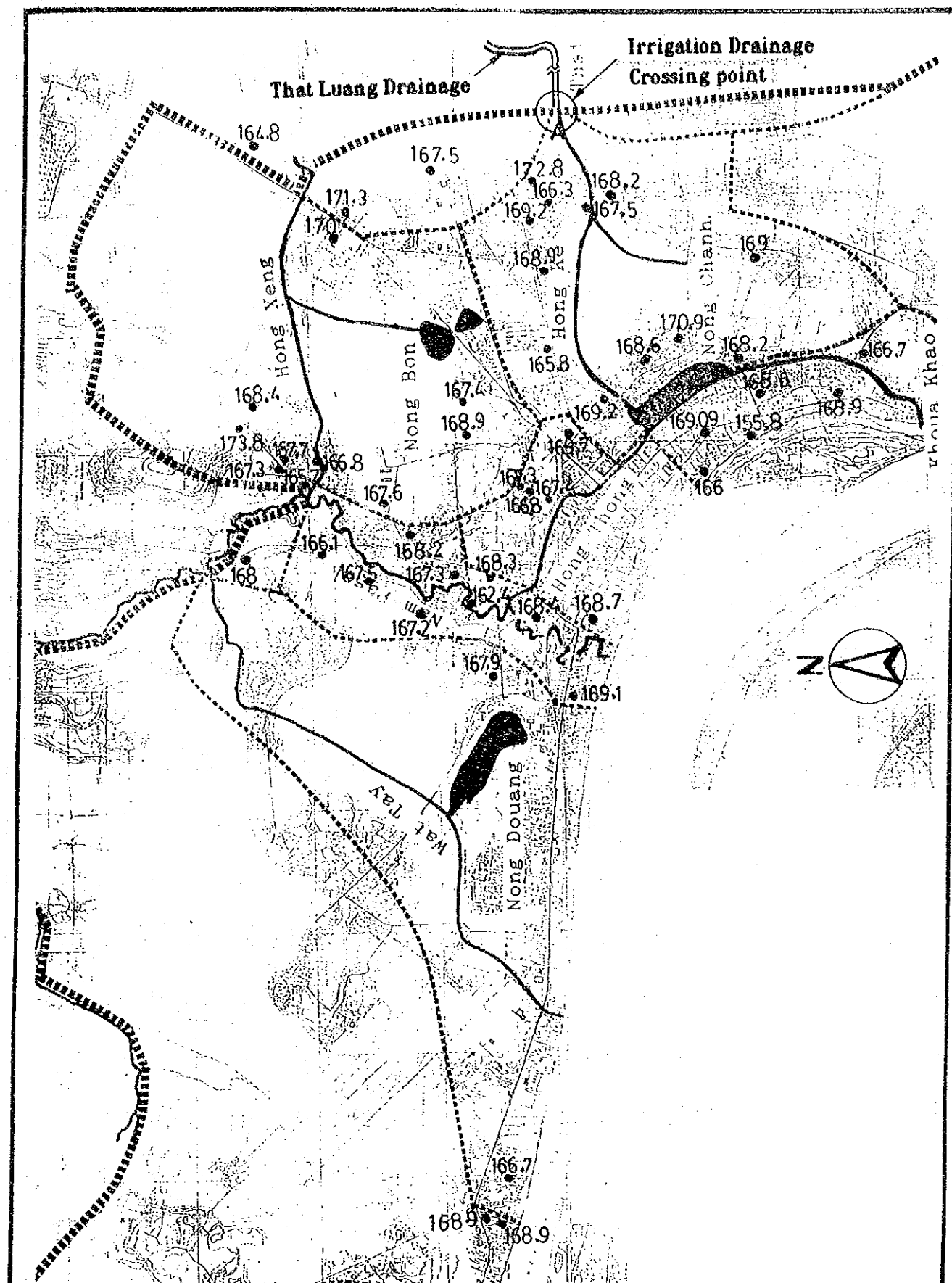


Fig. 2.11 Observed Ground Water Stage at Wells in Rainy Season

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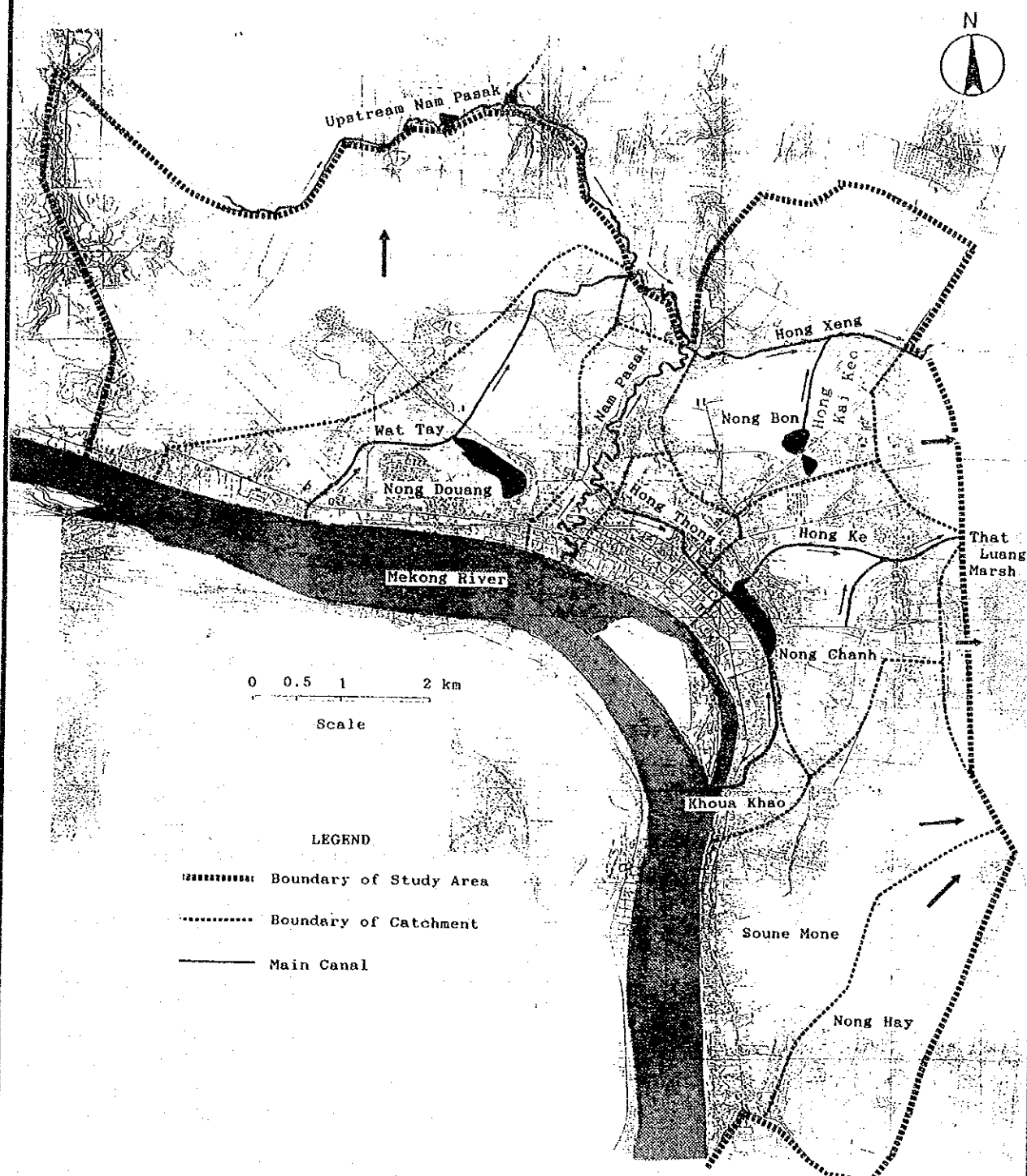


Fig. 2.12 Existing Drainage System in Vientiane

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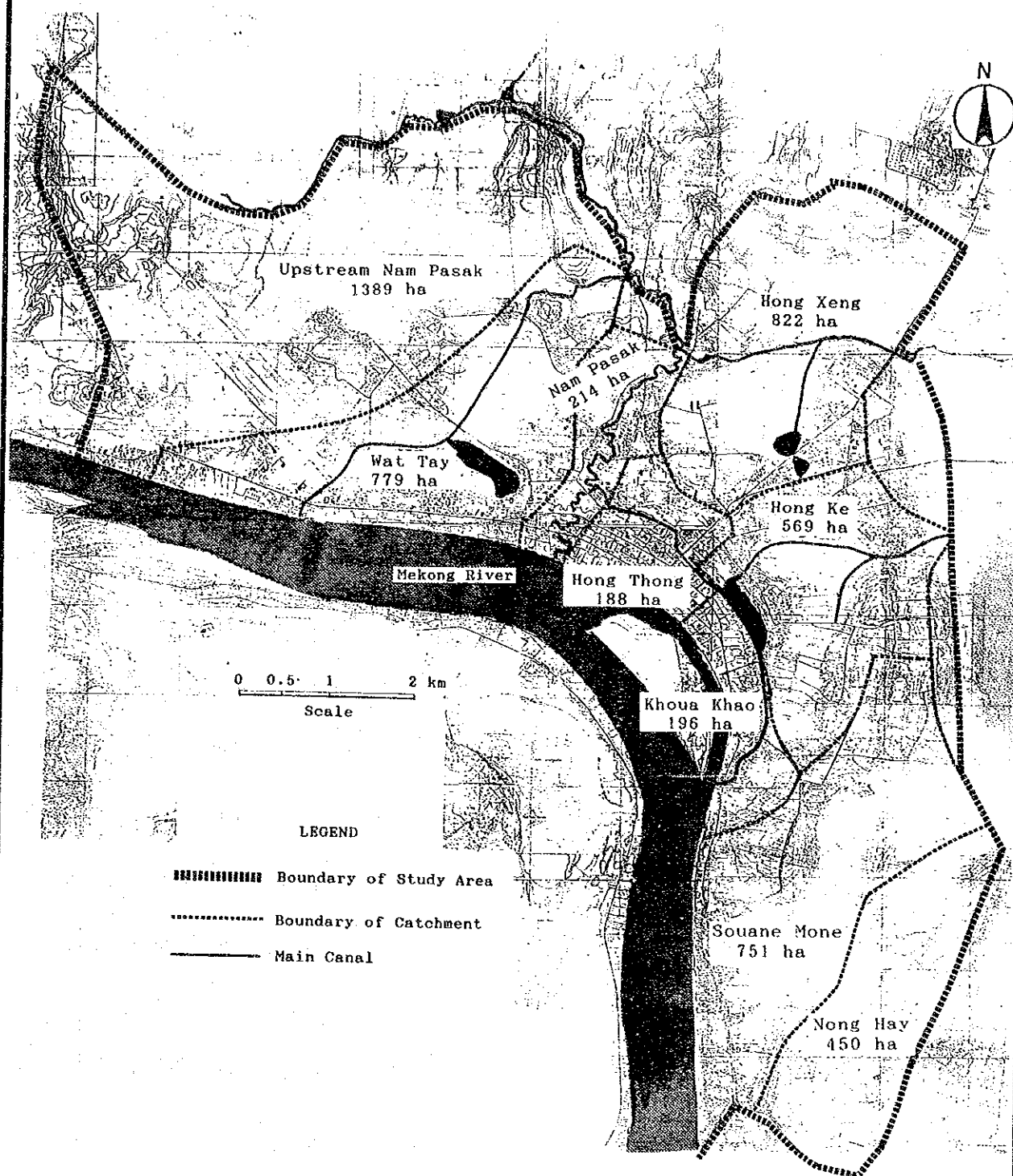
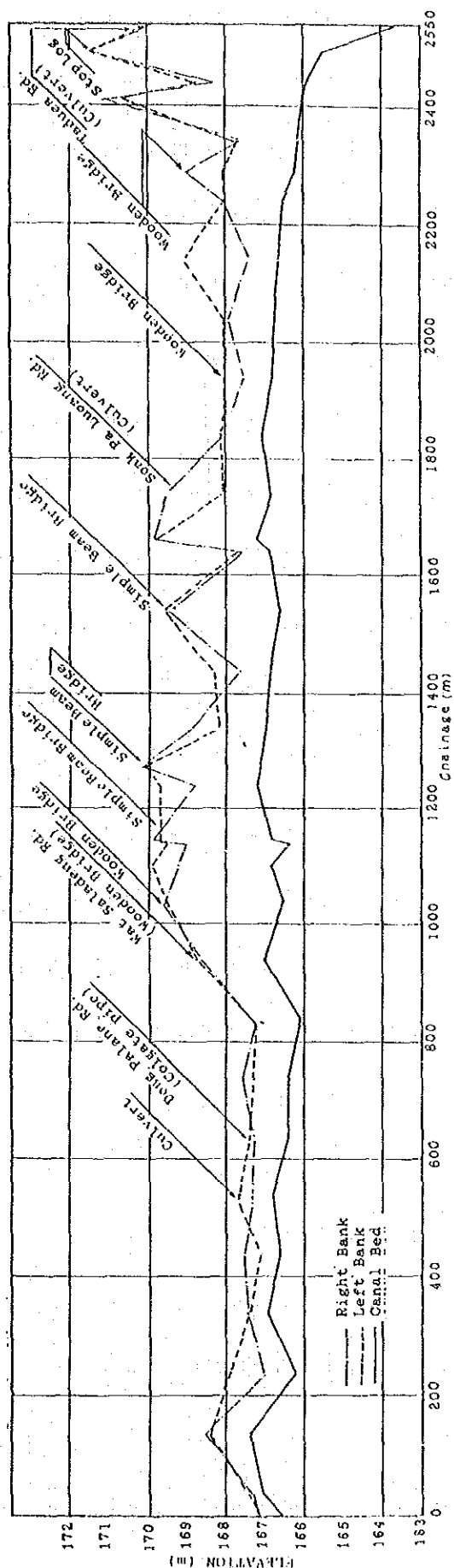


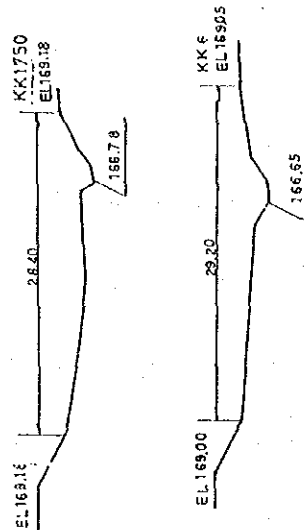
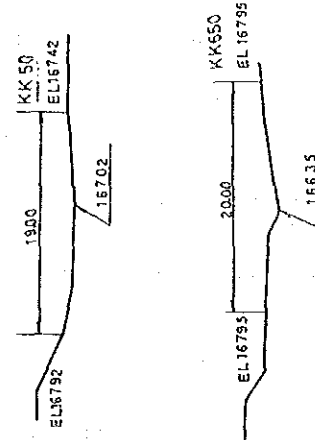
Fig. 2.13 Drainage Zones in Study Area

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LONGITUDINAL SECTION OF KHOUA KHAO



TYPICAL CROSS-SECTIONS



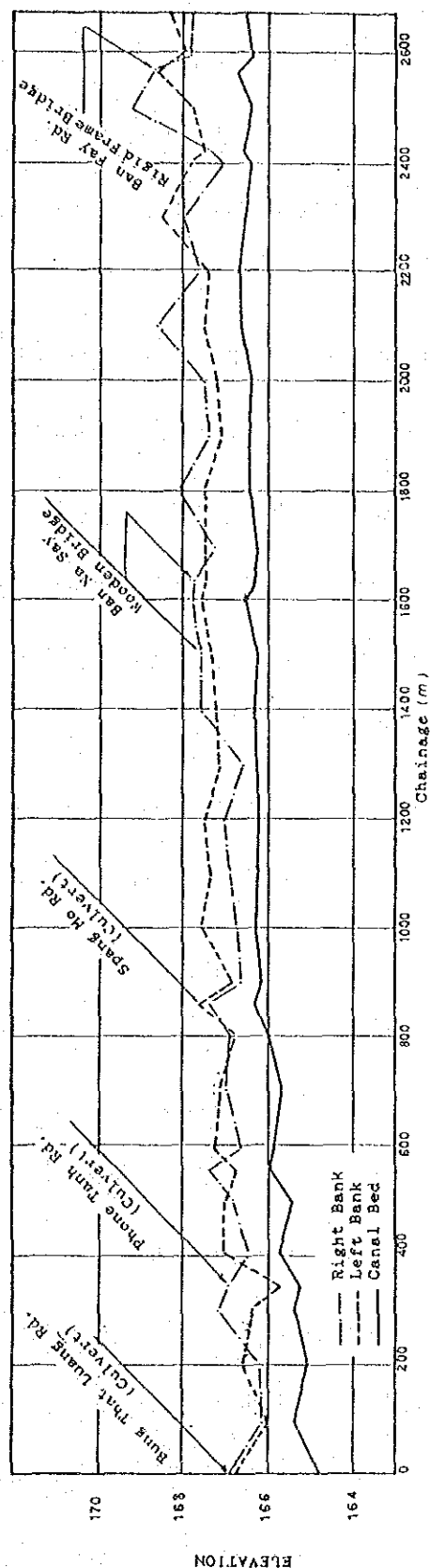
* KK2050 indicates the chainage.

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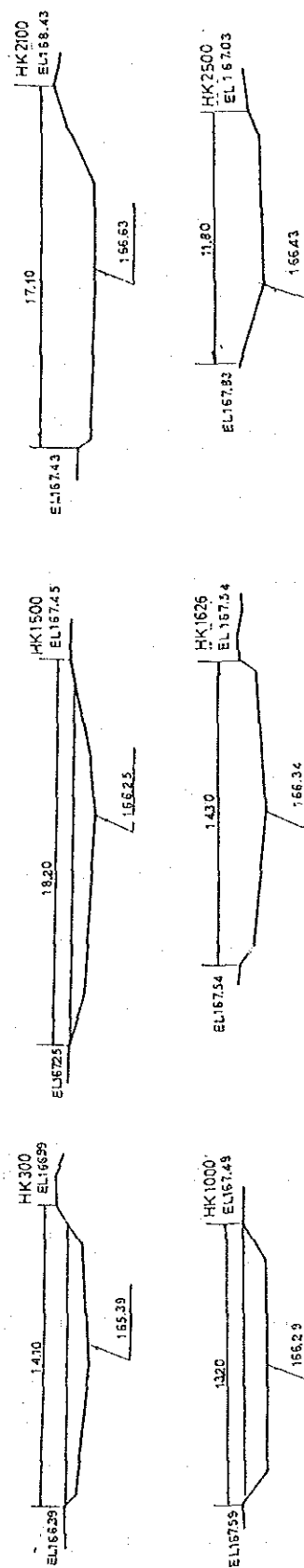
JAPAN INTERNATIONAL COOPERATION AGENCY

Fig. 2.14 Longitudinal Profile and Cross Section (Khoua Khao)

LONGITUDINAL SECTION OF HONG KE



TYPICAL CROSS-SECTIONS

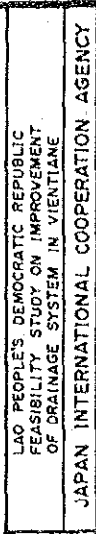


* HK2500 indicates the change.

LAO PEOPLE'S DEMOCRATIC REPUBLIC
FEASIBILITY STUDY ON IMPROVEMENT
OF DRAINAGE SYSTEM IN VIENTIANE

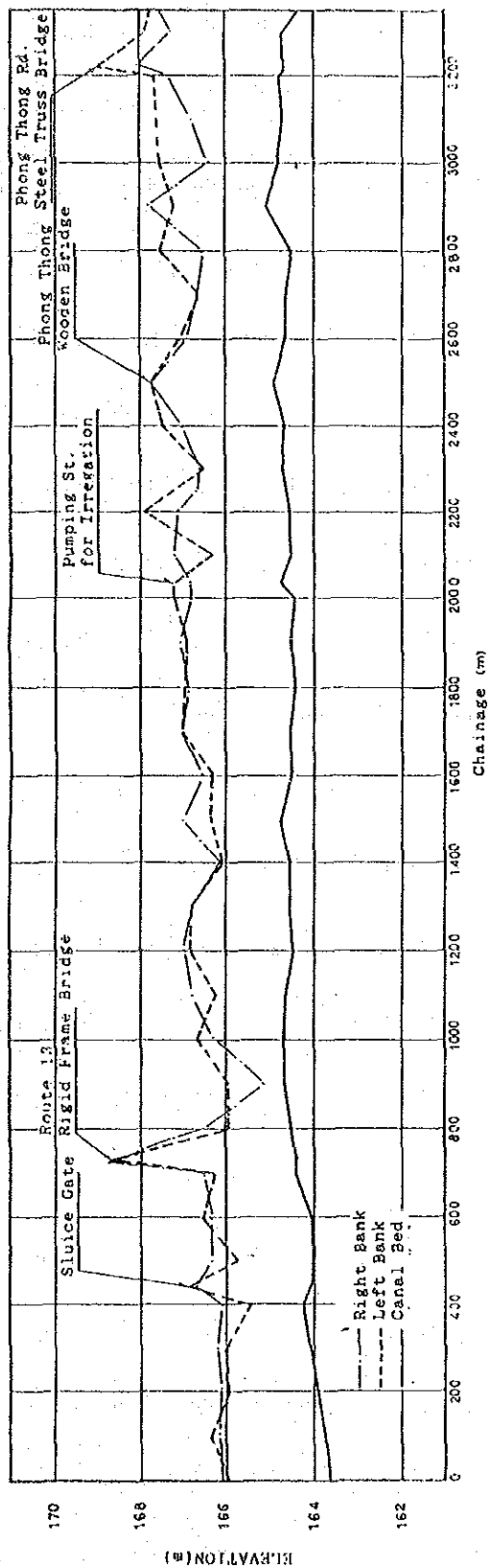
JAPAN INTERNATIONAL COOPERATION AGENCY

Fig. 2.16 Longitudinal Profile and Cross Section (Hong Ke)

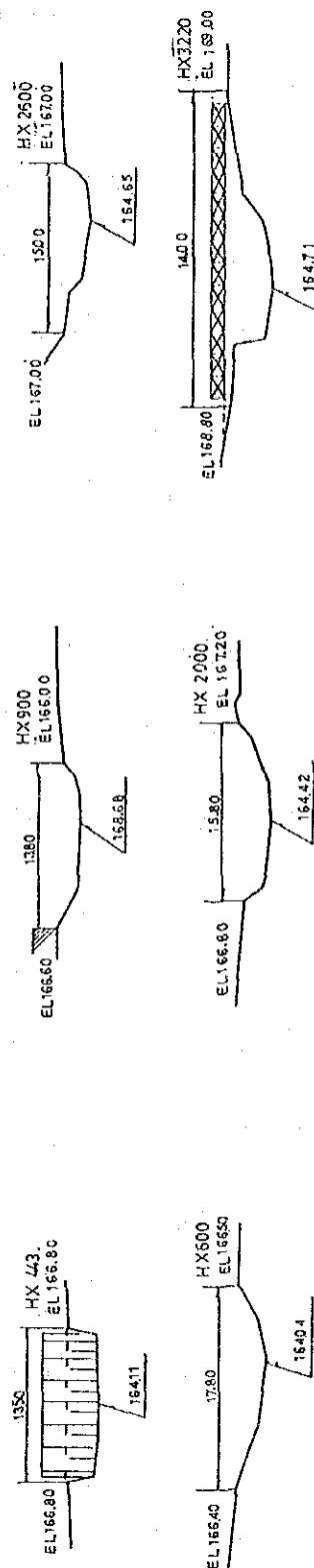


F - 17

LONGITUDINAL SECTION OF HONG XENG



TYPICAL CROSS-SECTIONS



* HX3220 indicates the chainage.

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Fig. 2.18 Longitudinal Profile and Cross Section (Hong Xeng)

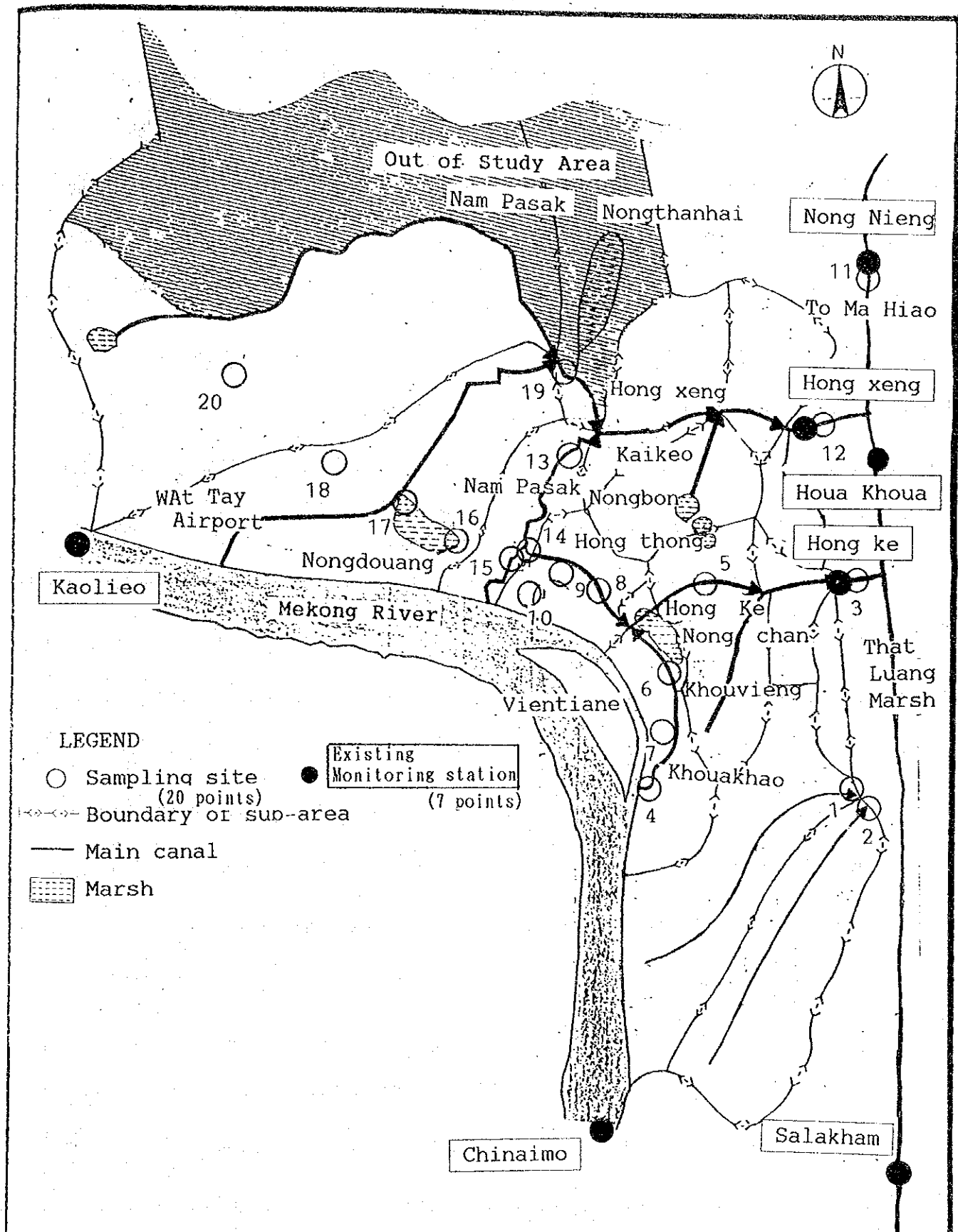
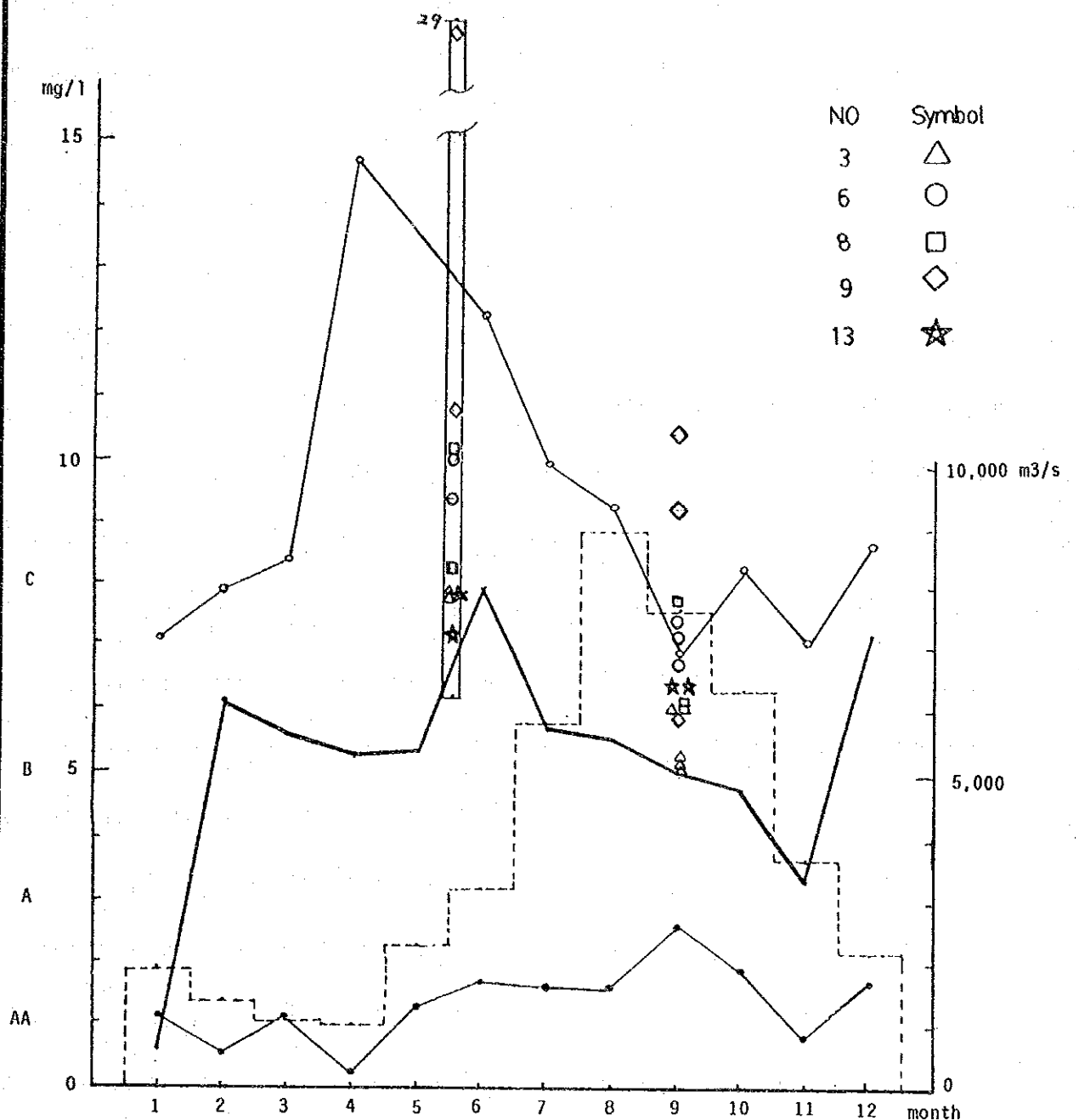


Fig. 2.19 Location of Water Sampling Sites

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LEGEND



COD : Drainage in Urban Area (The range of the water quality value in NO.4,6,7,8,9,10,14,15,16:May,June 1989)

— COD : Hong Ke (year1988)

○—○ $KMnO_4$ Consumed : Chinaimo (year 1988)

●—● COD : Kaolieo(year 1988)

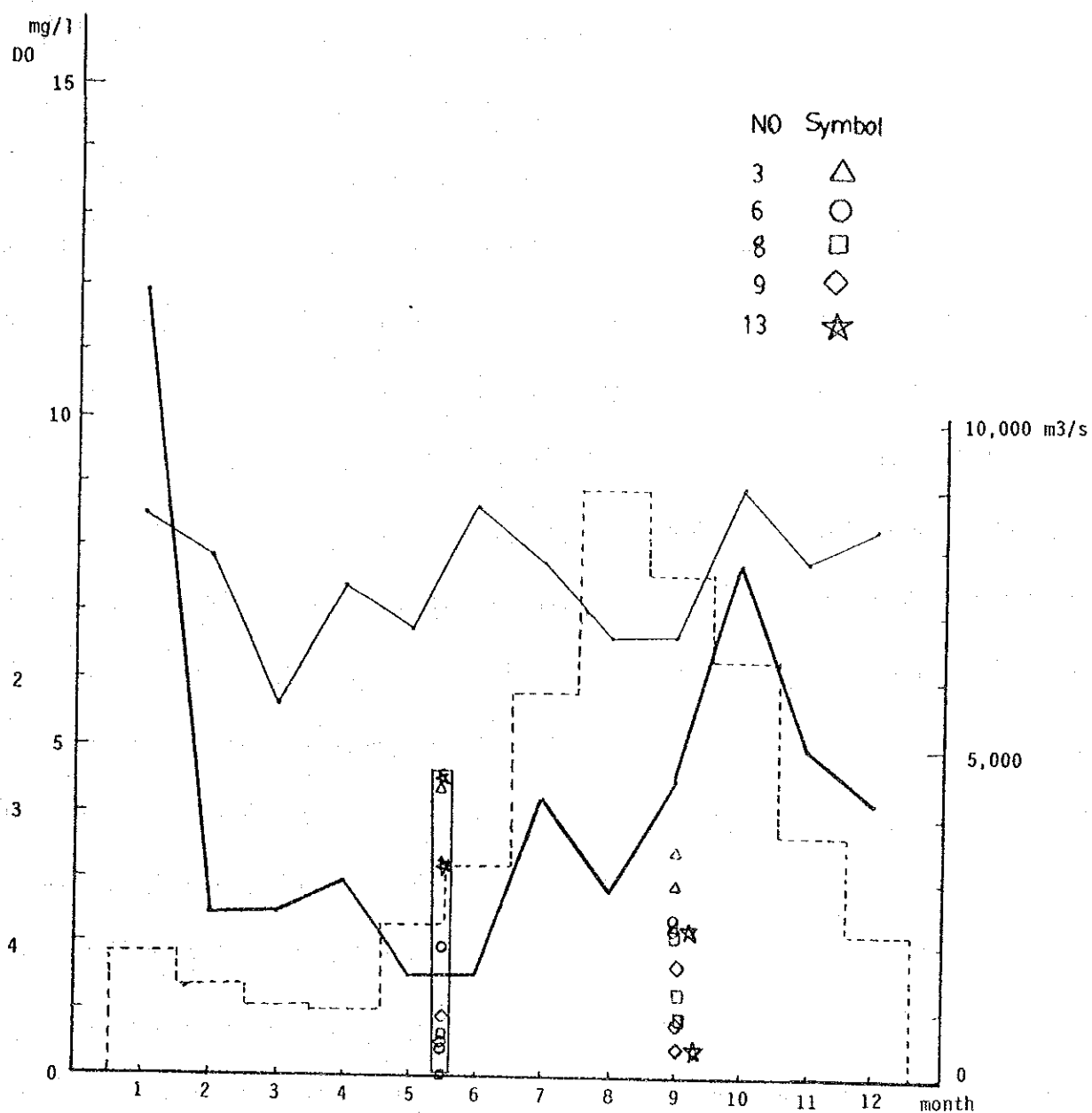
- - - discharge of MekongRiver at Vientiane (monthlyaverage;year 1986)

AA C Classification of water quality environmental standard of lake in Japan

Fig. 2.20 Annual Changes of Water Quality ($KMnO_4$ consumed)

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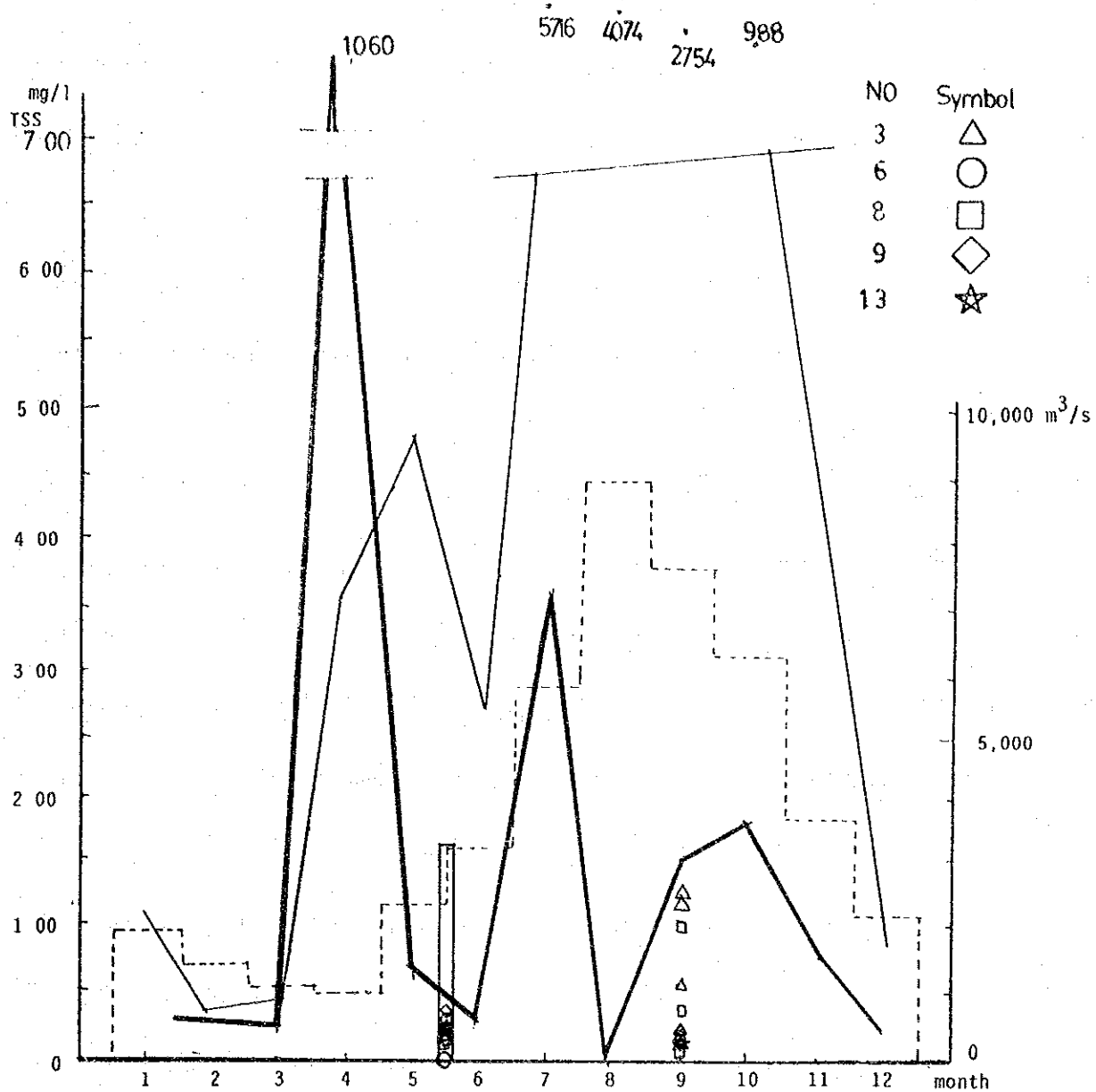


LEGEND

- DO : Drainage in Urban Area (The range of the water quality value in NO.4,6,7,8,9,10,14,15,16:May,June 1989)
- DO : Hong Ke (year 1988)
- DO: Kaolieo(year 1988)
- - - Discharge of Mekong River at Vientiane (Monthly Average: year1986)

2, 3, 4 Classification of water quality environmental standard of surface water in Thailand

Fig. 2.21 Annual Changes of Dissolved Oxygen (DO)



□ TSS : Drainage in Urban Area (The range of the water quality value in NO.4,6,7,8,9,10,14,15,16:May, June 1989)

— TSS : Hong Ke (year 1988)

— TSS : Kaolieo(year 1988)

- - - Discharge of Mekong River at Vientiane (monthly average: year 1986)

Fig. 2.22 Annual Changes of Total Suspended Solid (TSS)

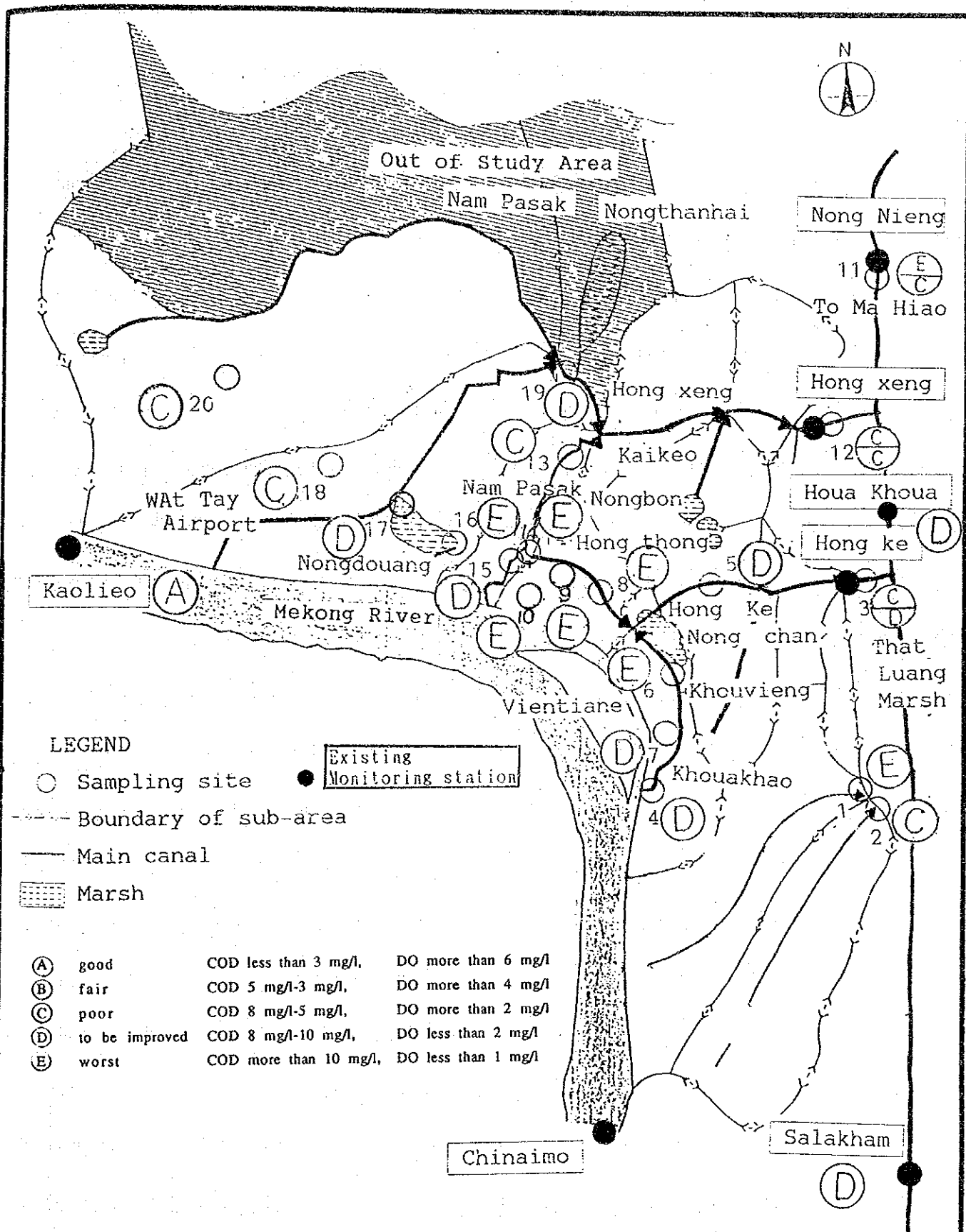


Fig. 2.23 Spatial Distribution of Water Quality

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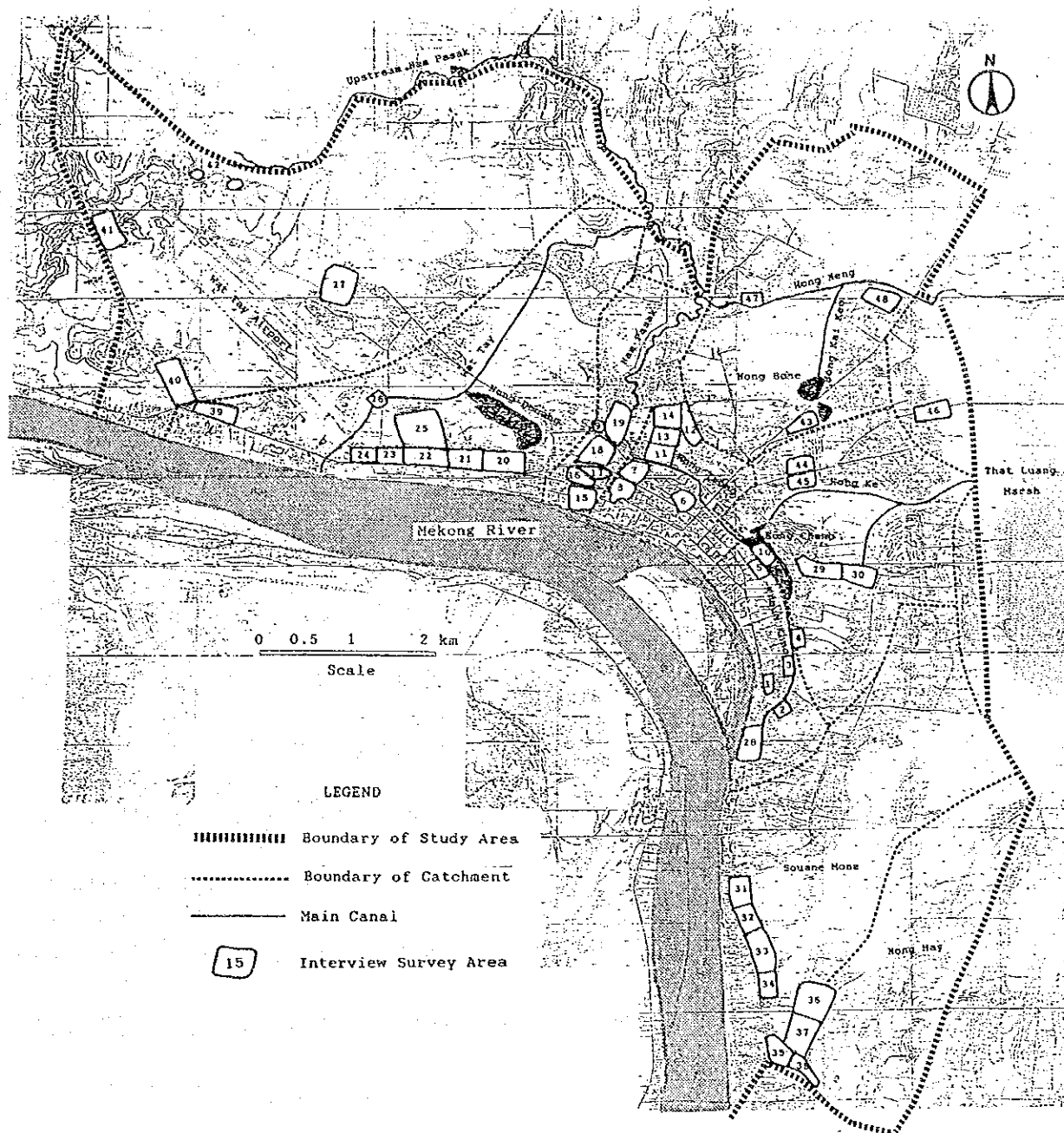


Fig. 2.24 Selected Areas of Inundation Damage Survey

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OF DRAINAGE SYSTEM IN VIENTIANE
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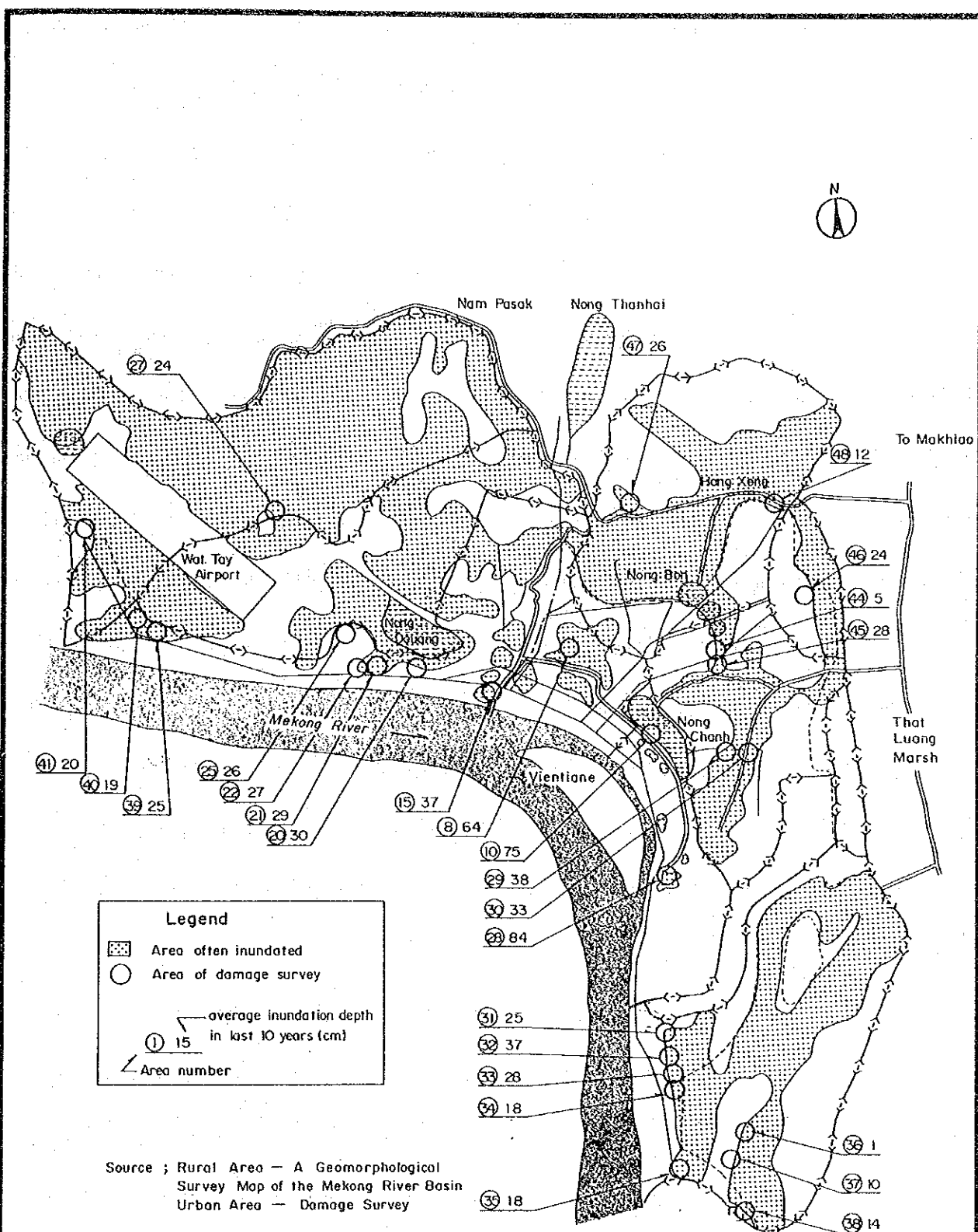


Fig. 2.25 Estimated Inundation Area for 10-year Storm

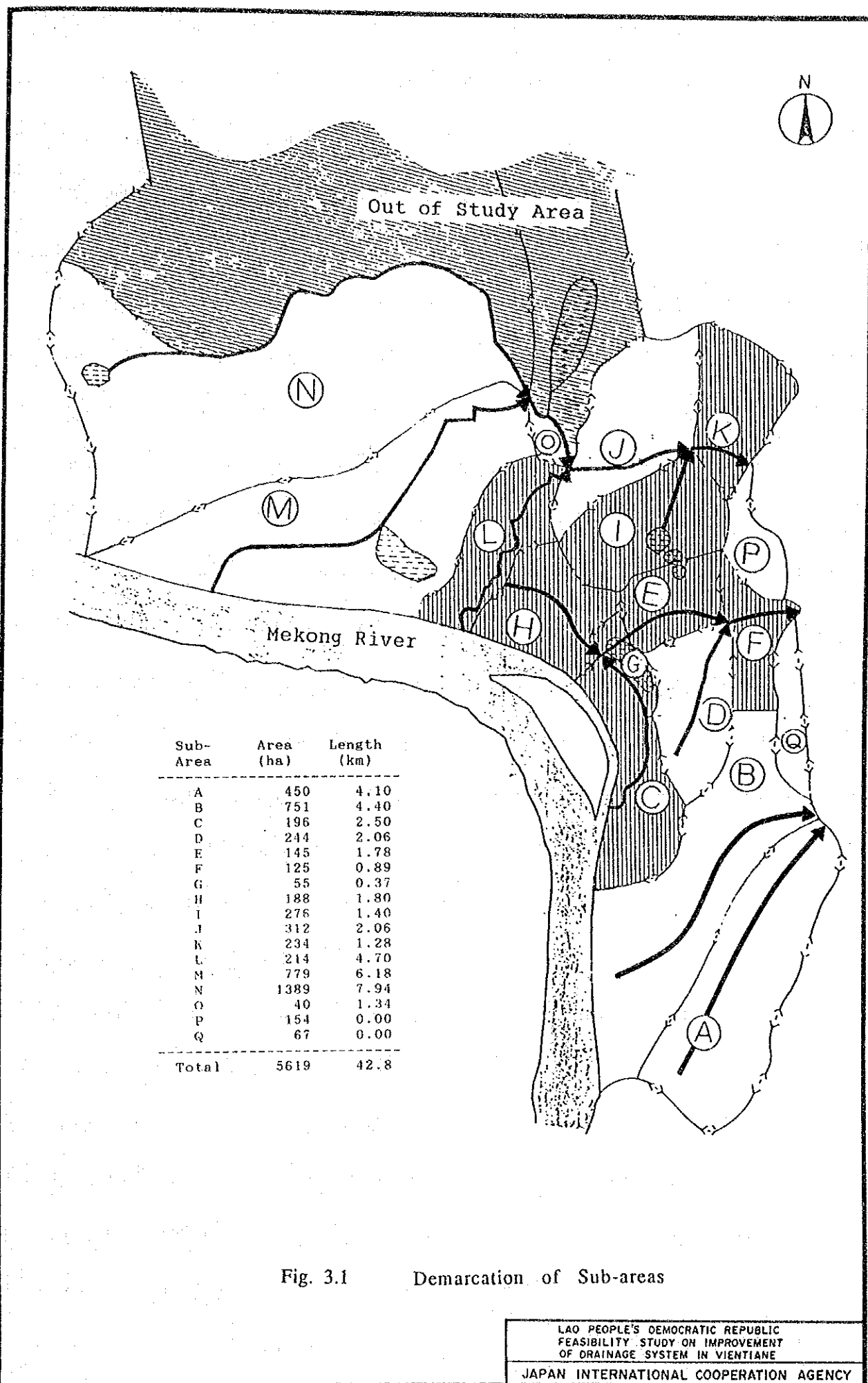


Fig. 3.1 Demarcation of Sub-areas

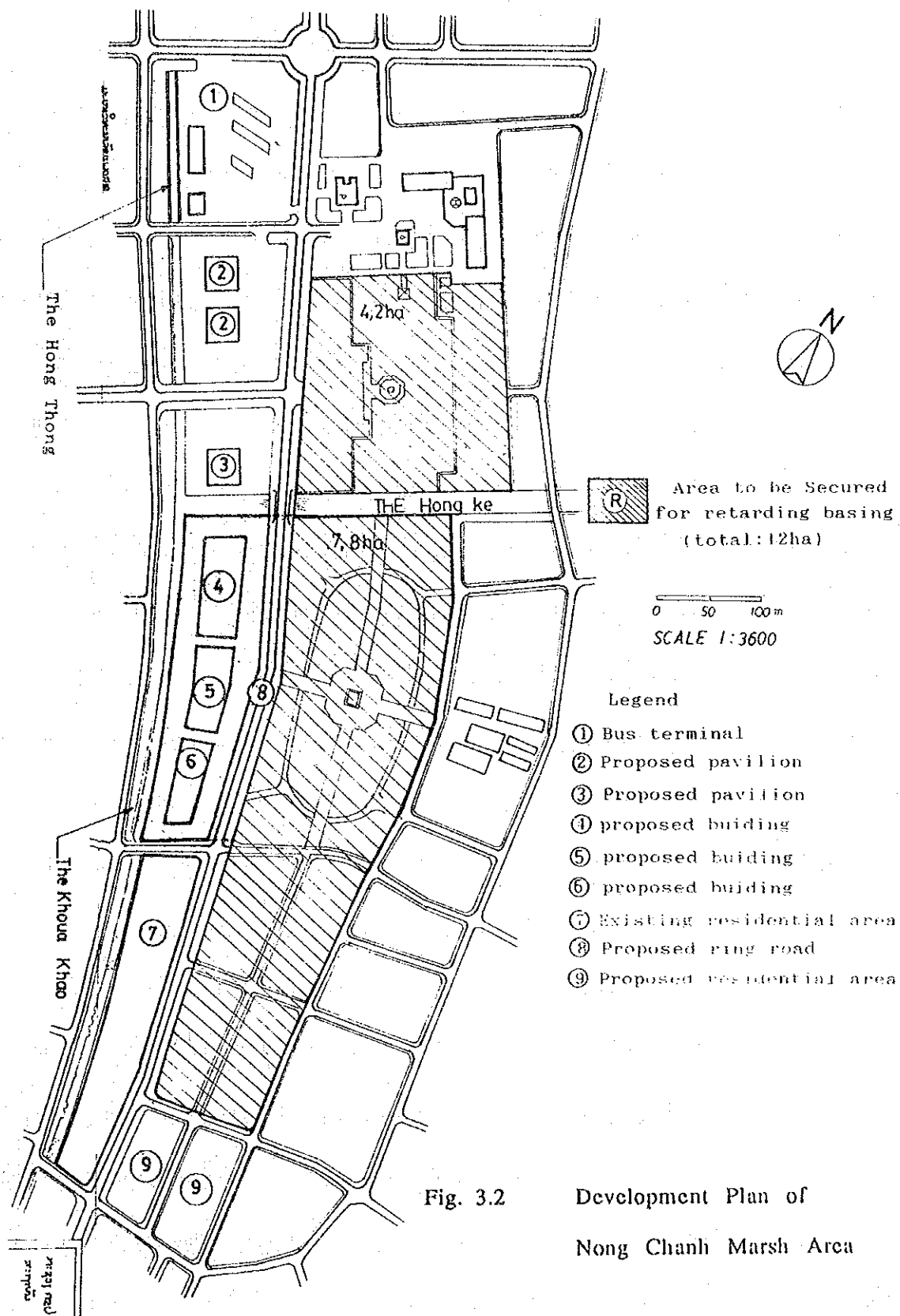


Fig. 3.2

Development Plan of Nong Chanh Marsh Area

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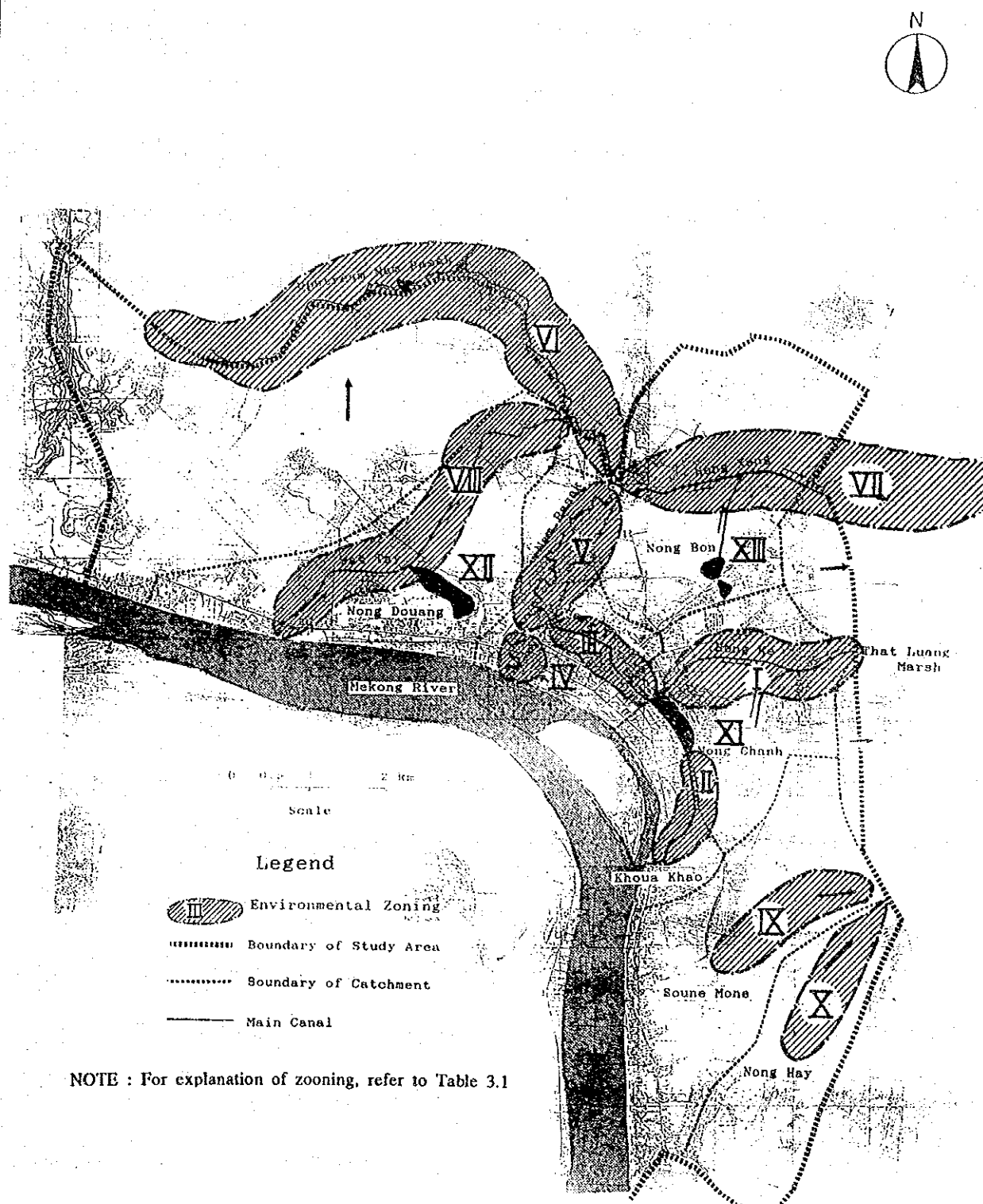


Fig. 3.3 Environmental Zoning

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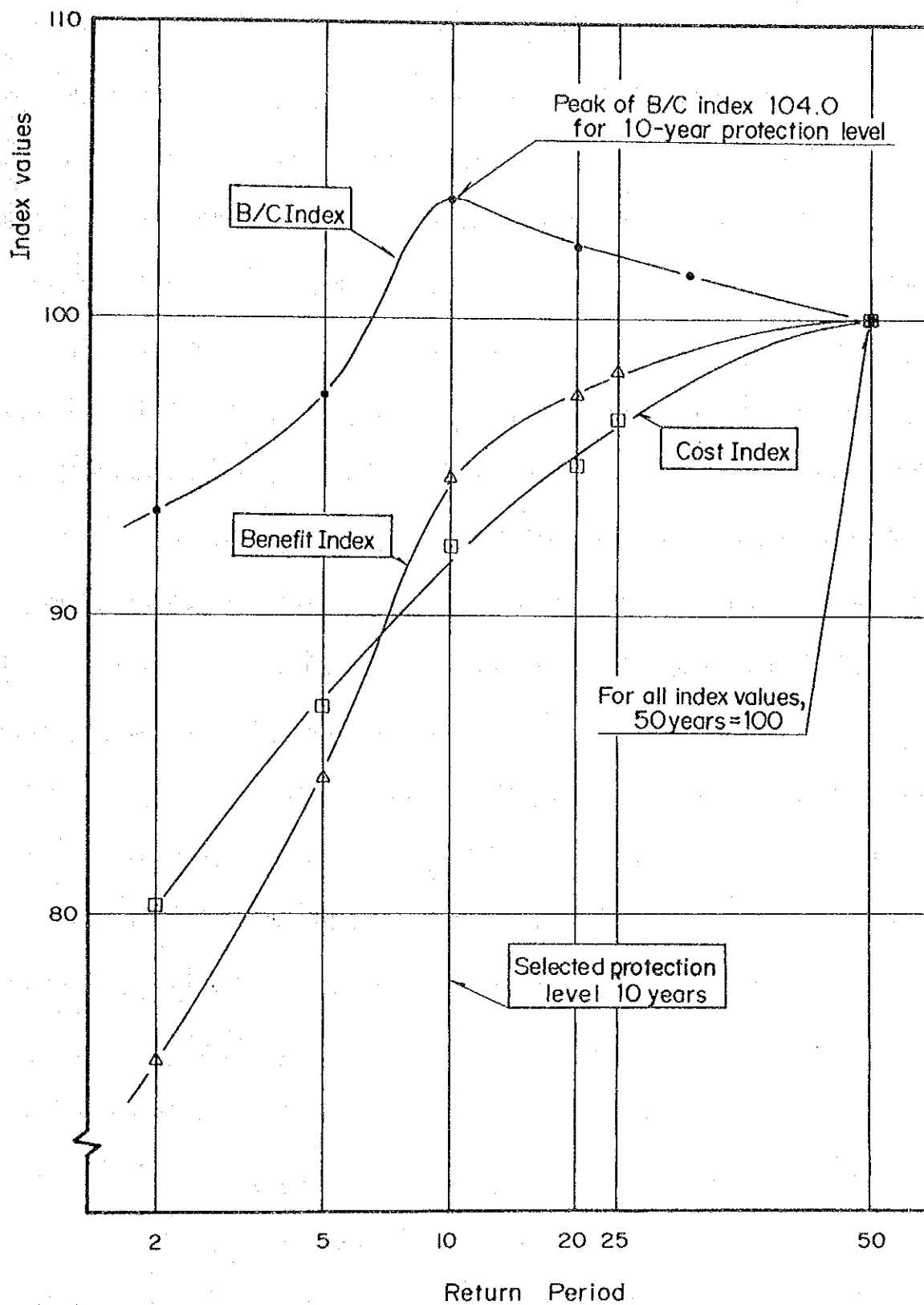


Fig. 4.2 Comparison of Alternative Protection Levels

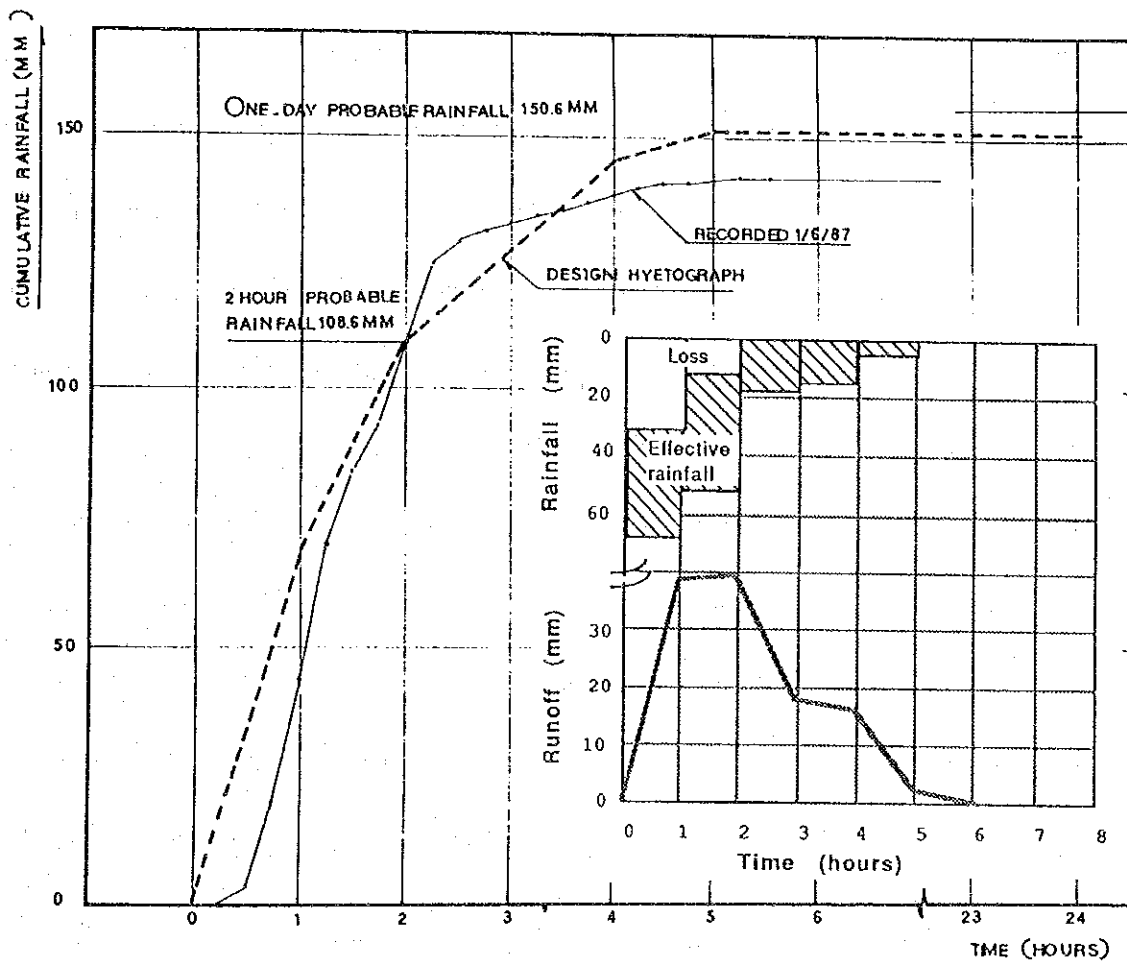
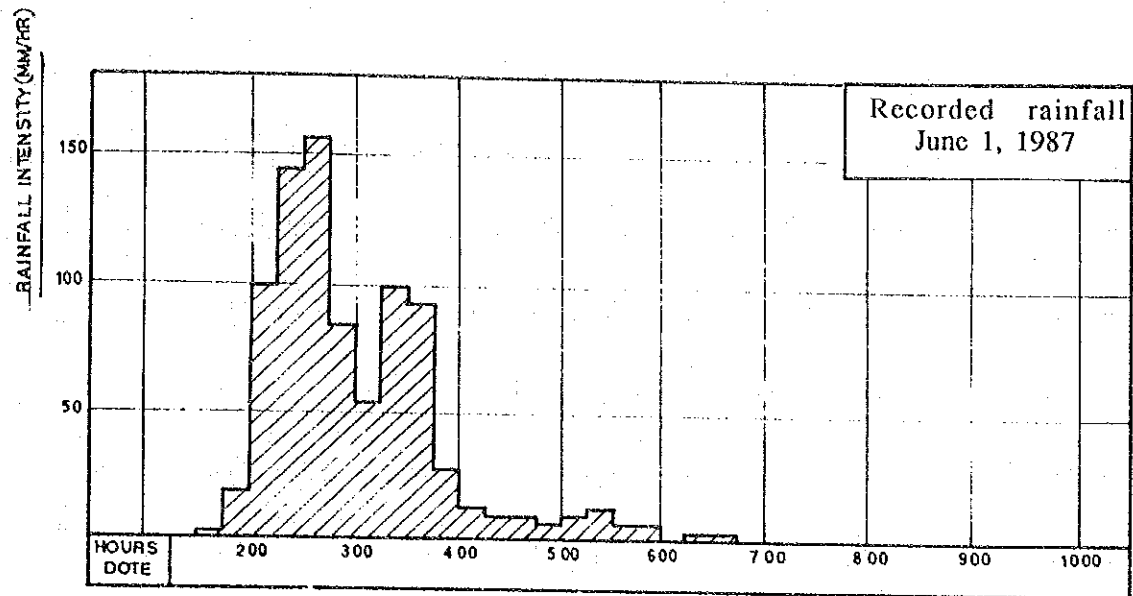
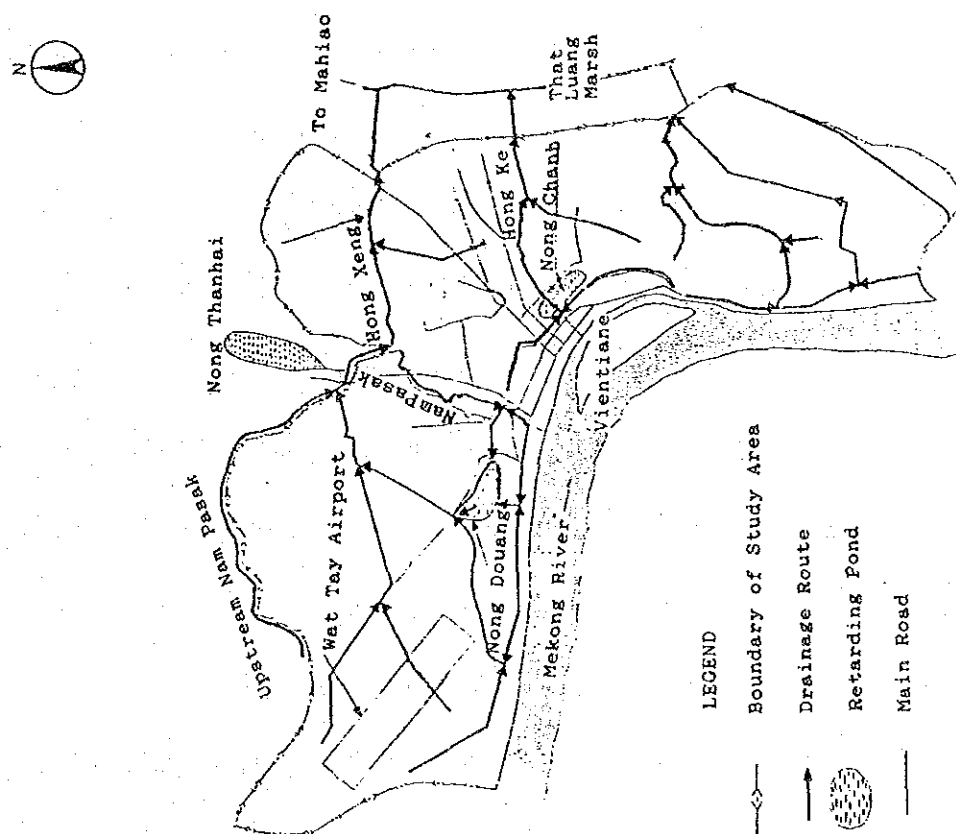


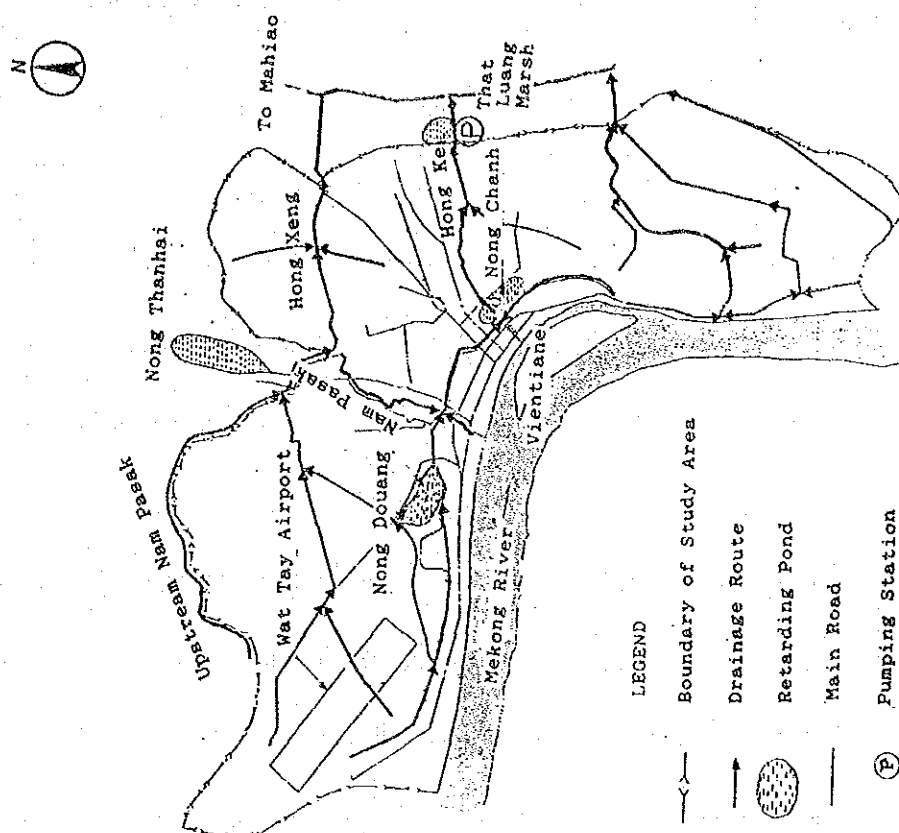
Fig. 4.3 Design Storm and Hydrograph

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Proposed Alternative Plan (Concept-1)

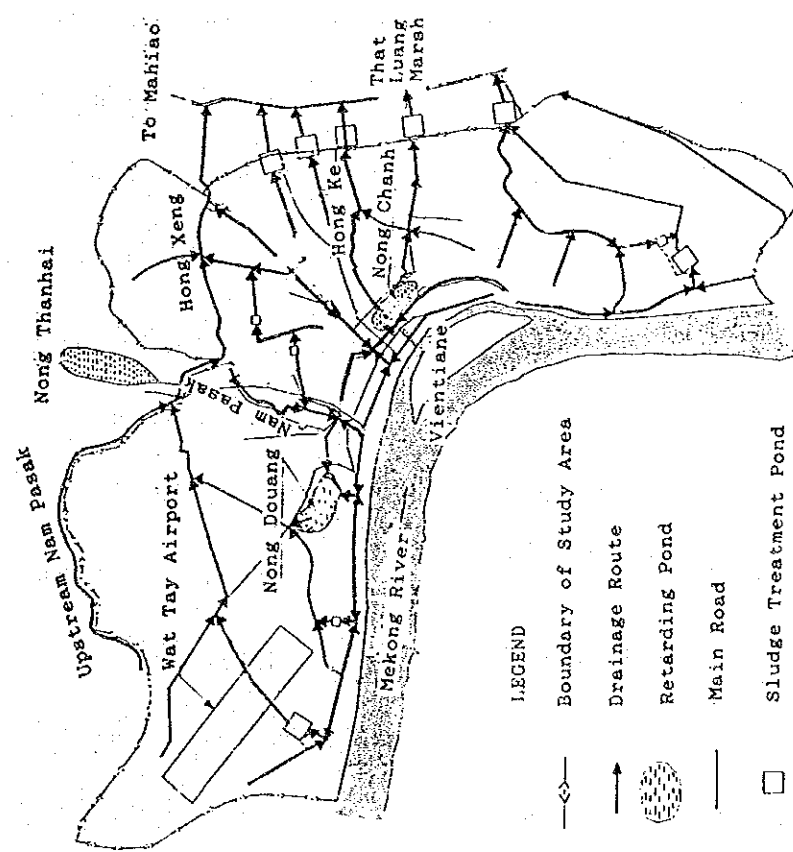


Proposed Alternative Plan (Concept-2)

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FEASIBILITY STUDY ON IMPROVEMENT
OF DRAINAGE SYSTEM IN VIENTIANE

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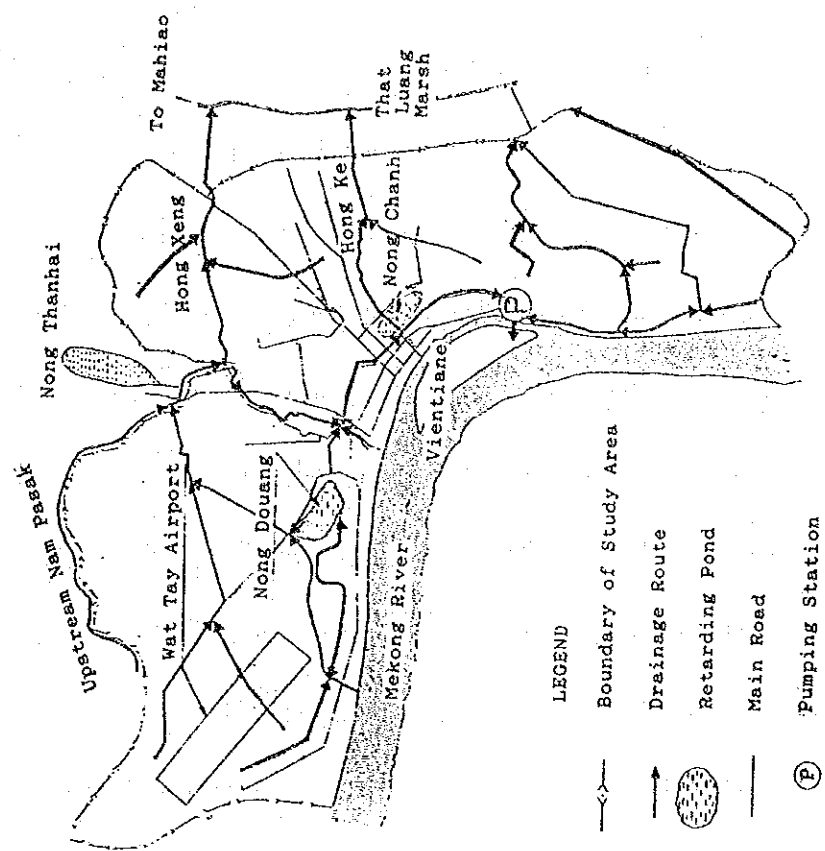
Fig. 5.1 (1) Alternative Basic Plans



LEGEND

- Boundary of Study Area
- Drainage Route
- Retarding Pond
- Main Road
- Sludge Treatment Pond

Proposed Alternative Plan (Concept-3)

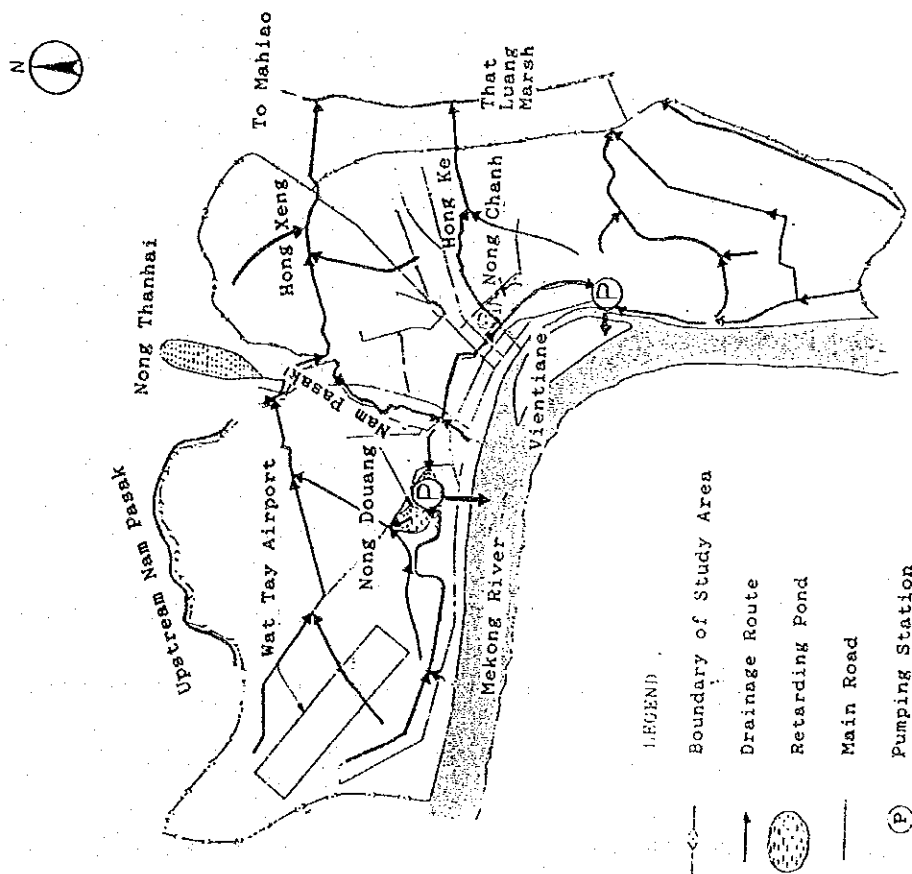


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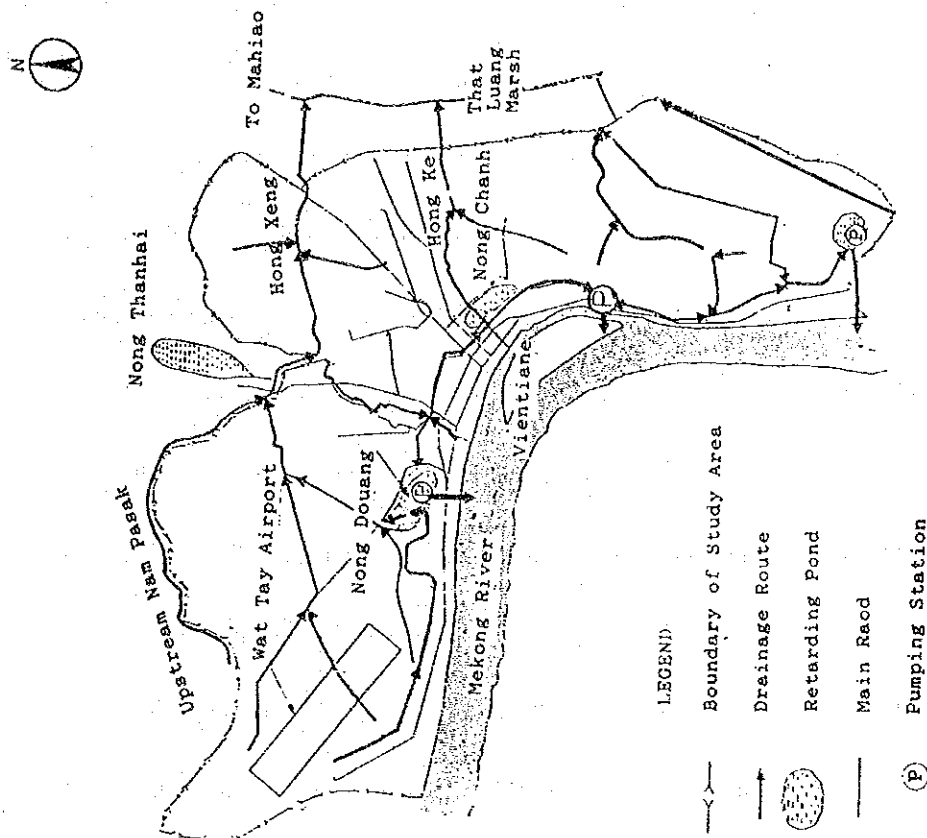
- Boundary of Study Area
- Drainage Route
- Retarding Pond
- Main Road
- Pumping Station

Proposed Alternative Plan (Concept-4)

Fig. 5.1 (2) Alternative Basic Plans

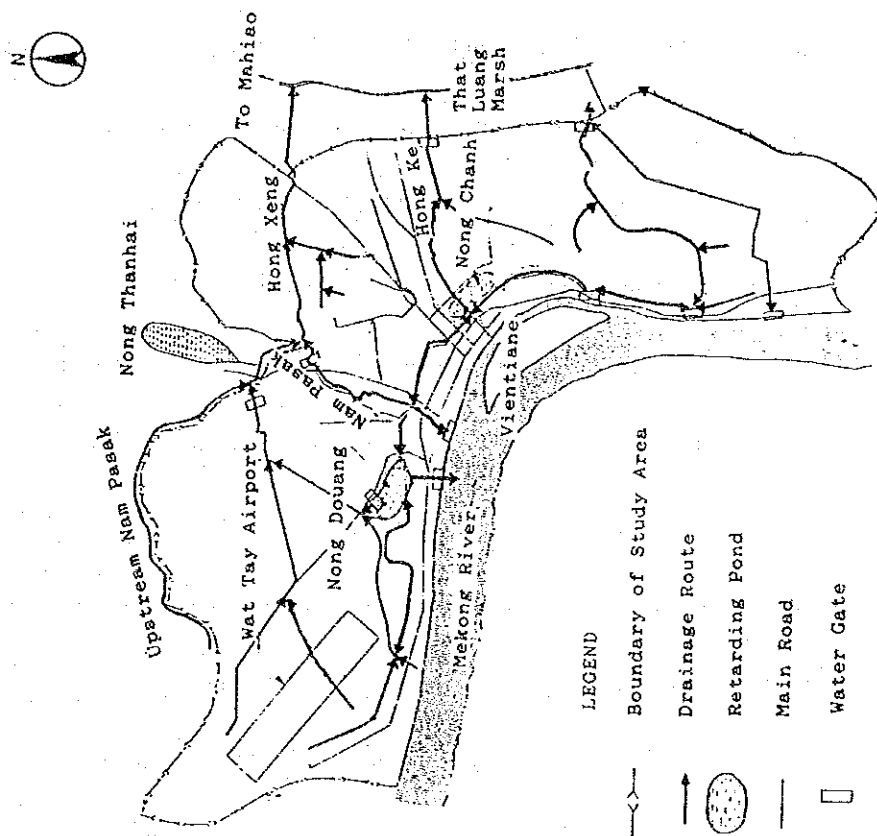


Proposed Alternative Plan (Concept-5)



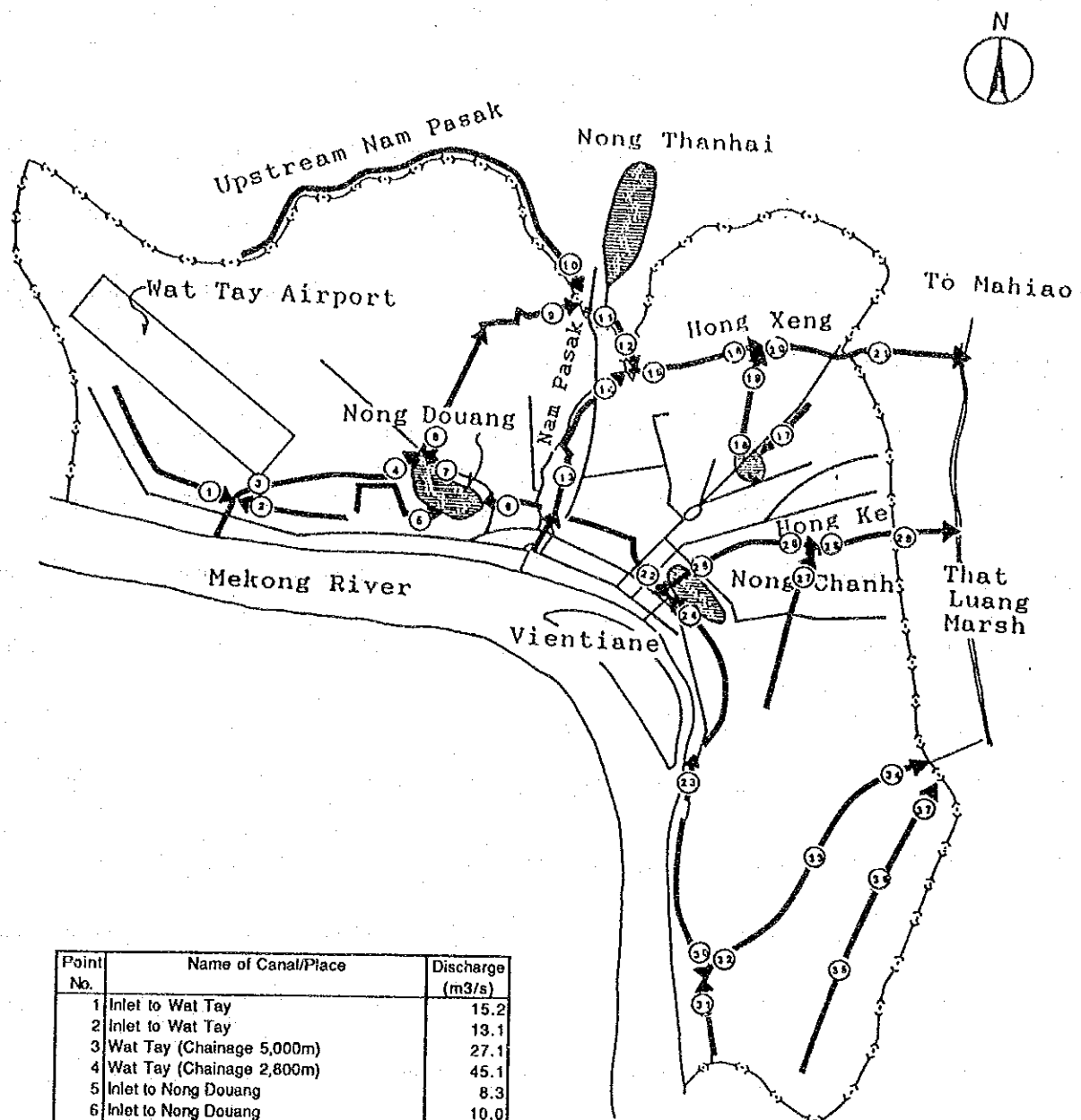
Proposed Alternative Plan (Concept-6)

Fig. 5.1 (3) Alternative Basic Plans



Proposed Alternative Plan (Concept-7)

Fig. 5.1 (4) Alternative Basic Plans

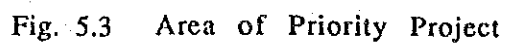


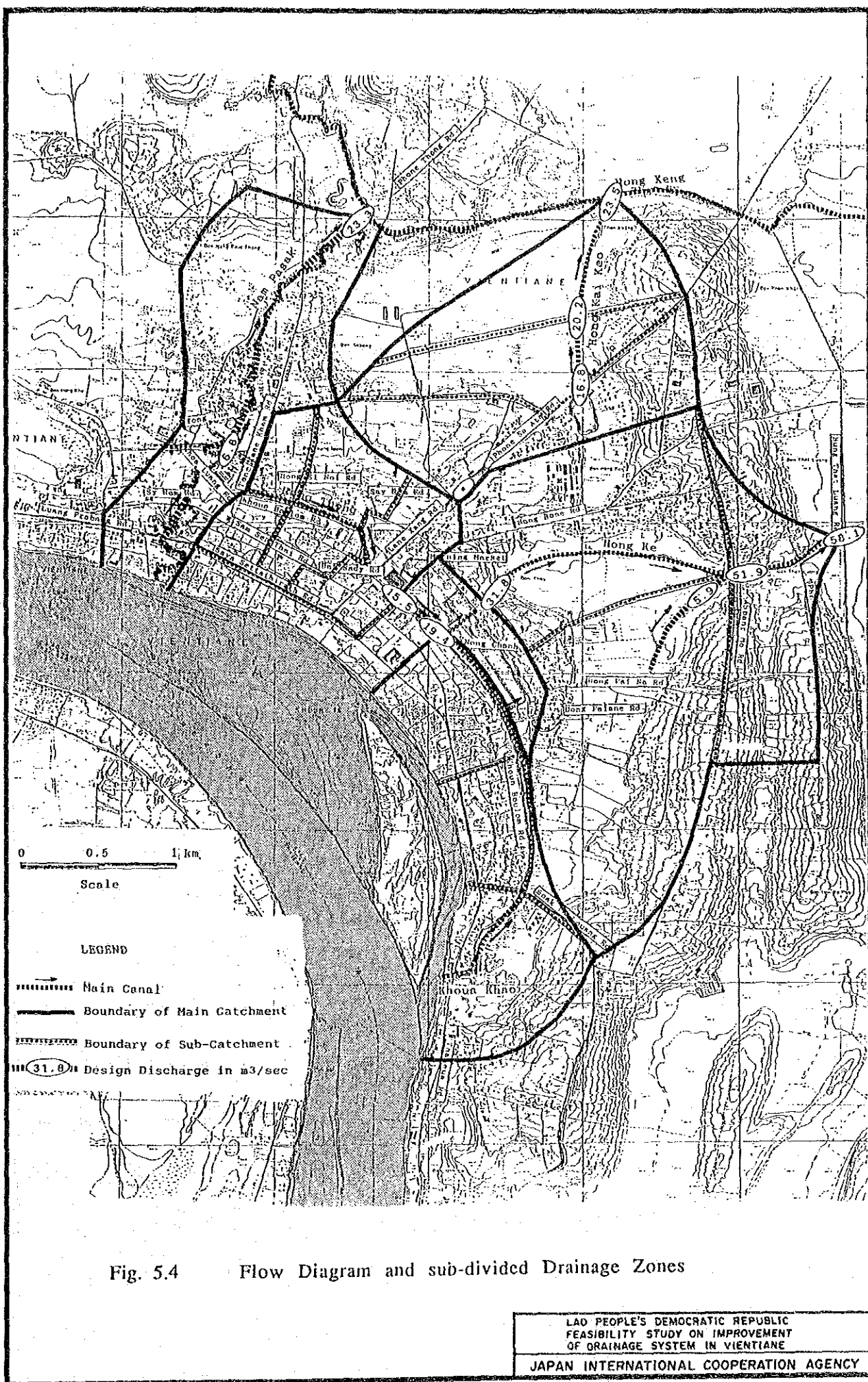
Point No.	Name of Canal/Place	Discharge (m ³ /s)
1	Inlet to Wat Tay	15.2
2	Inlet to Wat Tay	13.1
3	Wat Tay (Chainage 5,000m)	27.1
4	Wat Tay (Chainage 2,800m)	45.1
5	Inlet to Nong Douang	8.3
6	Inlet to Nong Douang	10.0
7	Outlet from Nong Douang	8.2
8	Wat Tay (Chainage 2,800m)	45.7
9	Wat Tay (Chainage 0 m)	55.8
10	Upstream Nam Pasak	30.0
11	Upstream Nam Pasak	84.2
12	Upstream Nam Pasak	119.0
13	Nam Pasak (Chainage 2,800 m)	6.8
14	Nam Pasak (Confluence with Hong Xeng)	23.3
15	Hong Xeng (Chainage 3,344 m)	131.5
16	Hong Xeng (Confluence with H. Kai Keo)	139.7
17	Inlet to Nong Bon	17.6
18	Outlet from Nong Bon	16.8
19	Hong Kai Keo (Confluence with H. Xeng)	23.5
20	Hong Xeng (Chainage 1,600 m)	154.8
21	Hong Xeng at sluice gate	159.1
22	Hong Thong (Inlet to Nong Chanh)	20.9
23	Khousa Khao at Upstream	9.2
24	Khousa Khao (Inlet to Nong Chanh)	17.5

Point No.	Name of Canal/Place	Discharge (m ³ /s)
25	Outlet from Nong Chanh	42.9
26	Hong Ke (Chainage 800 m)	60.8
27	Dong Pai Na (Confluence with Hong Ke)	5.9
28	H. Ke (Chainage 800 m after confluence)	61.2
29	Hong Ke (Outlet to That Luang)	70.5
30	Thadeua Road (Souane Mone Area)	14.5
31	Thadeua Road (Souane Mone Area)	7.2
32	Inlet to Drainage Canal	19.3
33	Irrigation Drainage (Chainage 2,700m)	28.6
34	Outlet to That Luang Marsh	38.2
35	Irrigation Drainage(Chainage 1,370m)	21.2
36	Irrigation Drainage(Chainage 2,730m)	31.5
37	Outlet to That Luang Marsh	36.3

Fig. 5.2 Proposed Basic Plan

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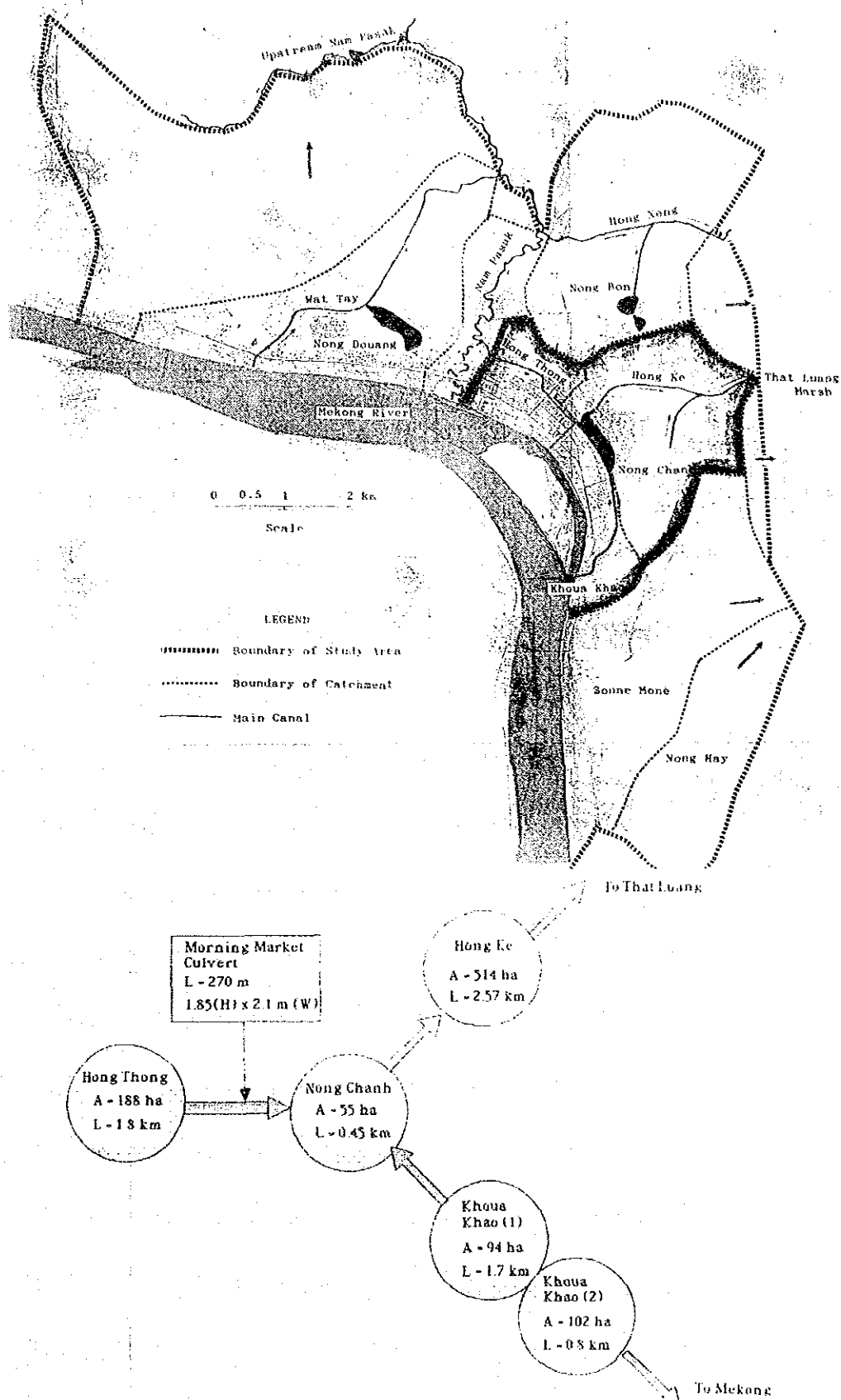


Fig. 6.1 Present Drainage Condition in Hong Ke System

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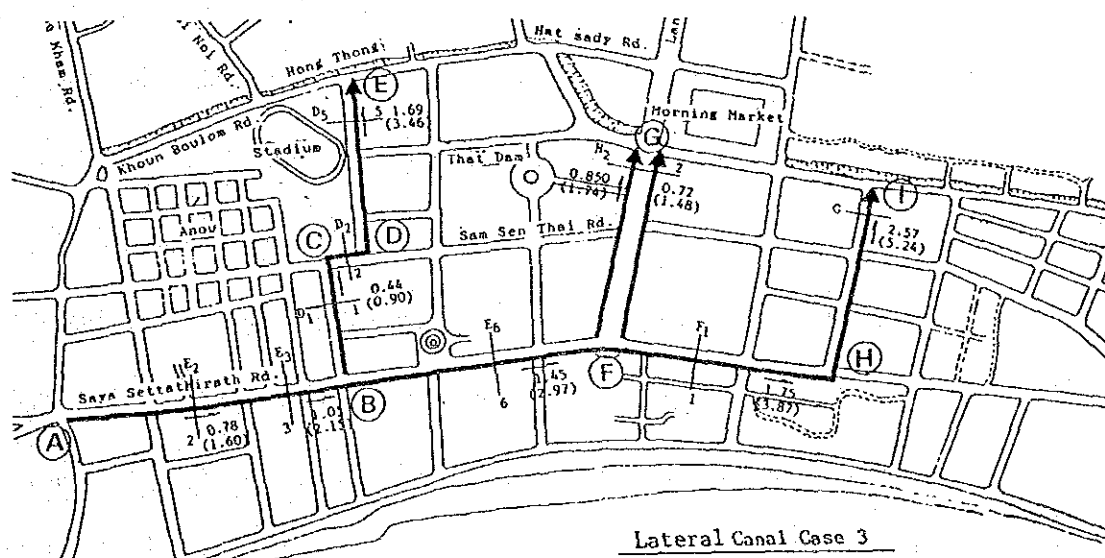
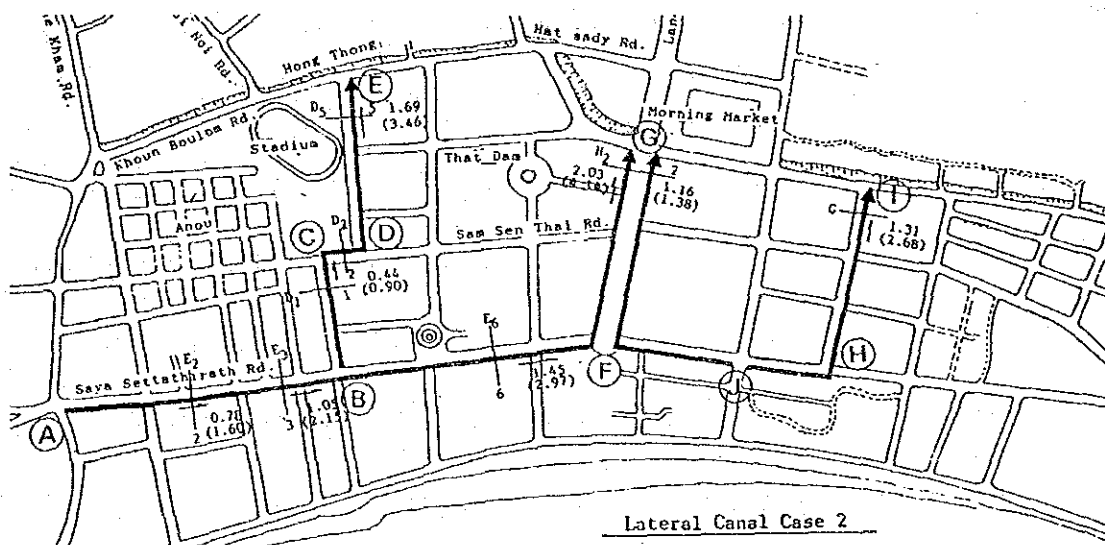
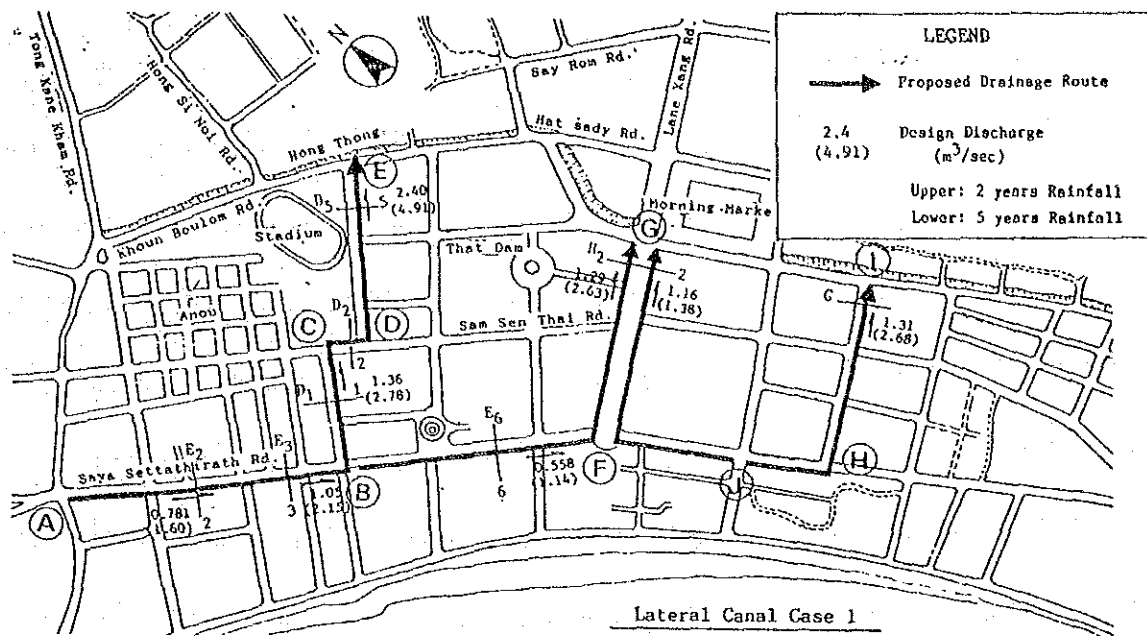
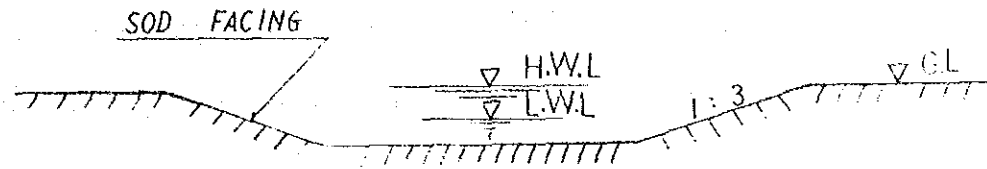


Fig. 6.2 Considered Alternatives for
Lateral Canals in Hong Ke System

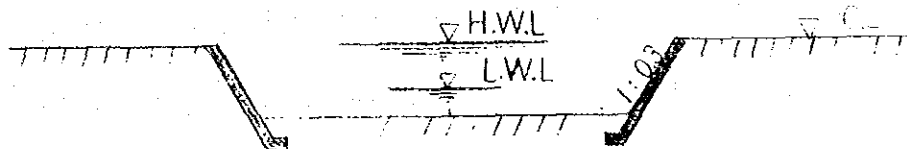
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TYPE OF CROSS SECTION

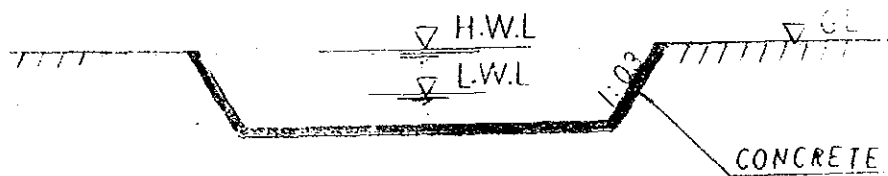
TYPE 1



TYPE 2



TYPE 3



TYPE 4

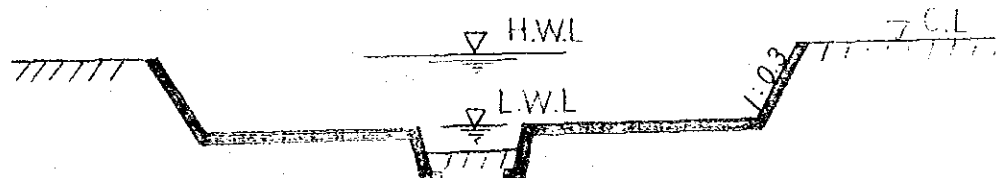
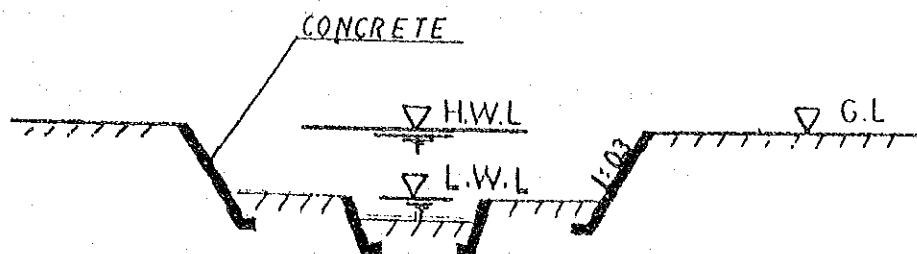


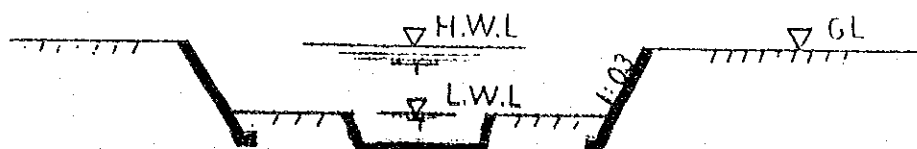
Fig. 6.3 (1) Facility Alternatives for Section and Revetment of Main Channels

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OF DRAINAGE SYSTEM IN VIENTIANE
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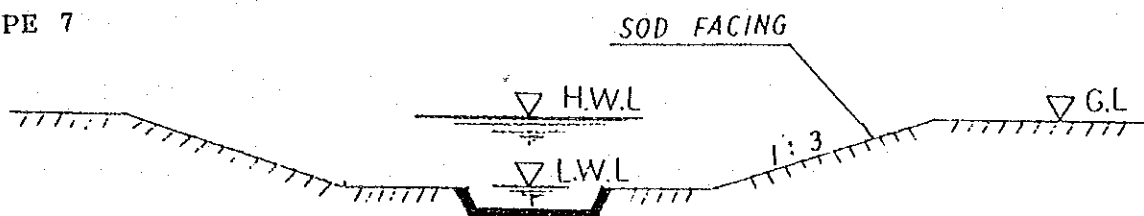
TYPE 5



TYPE 6



TYPE 7



TYPE 7'

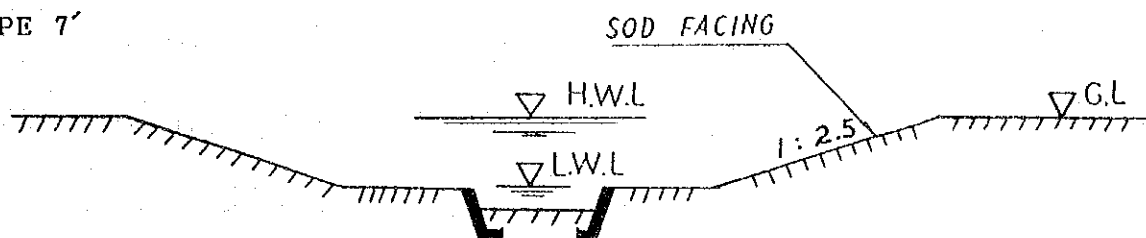
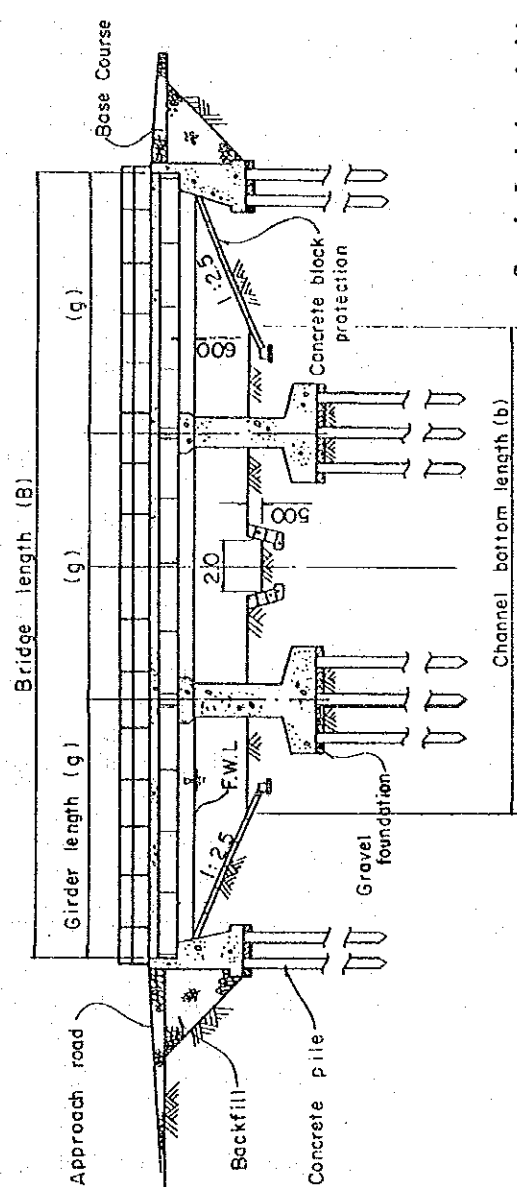


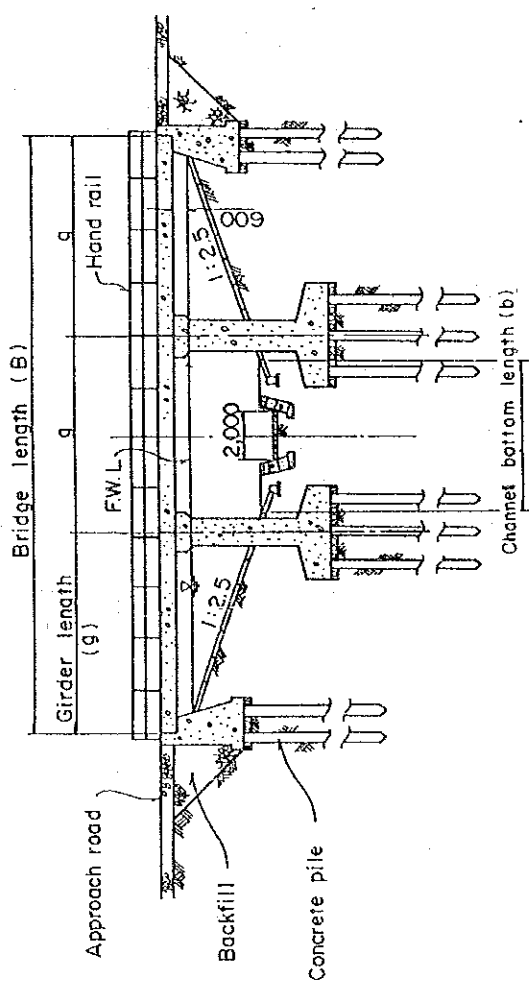
Fig. 6.3 (2) Facility Alternatives for Section and Revetment of Main Channels

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Steel I-girder bridge



RC Slab bridge

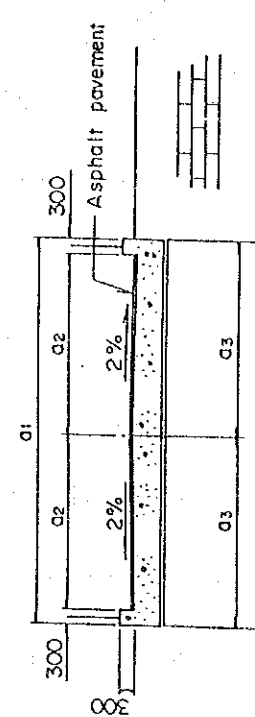
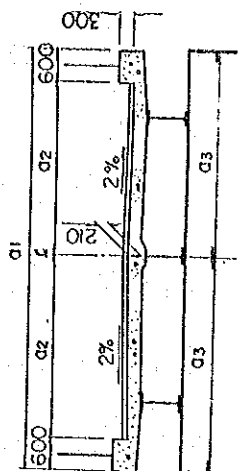


Fig. 6.4 (1) Facility Alternatives for Bridge and Culvert

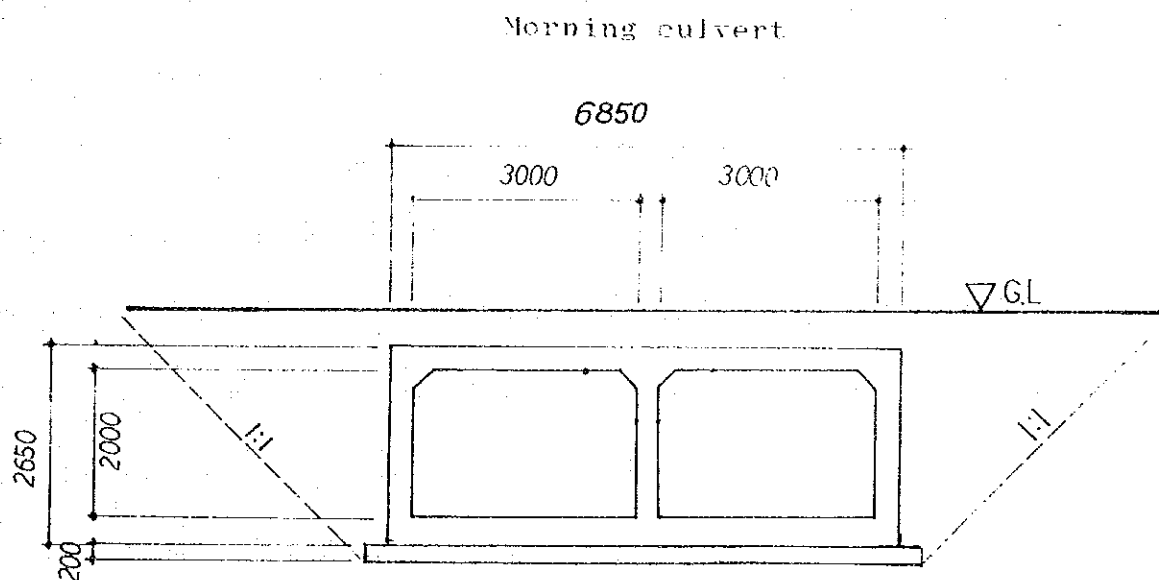
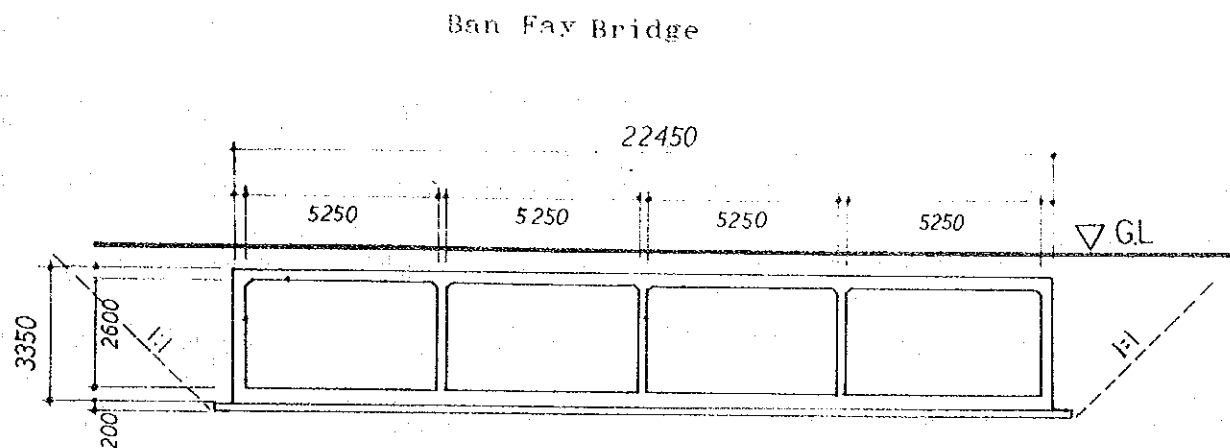


Fig. 6.4 (2) Facility Alternatives for Bridge and Culvert

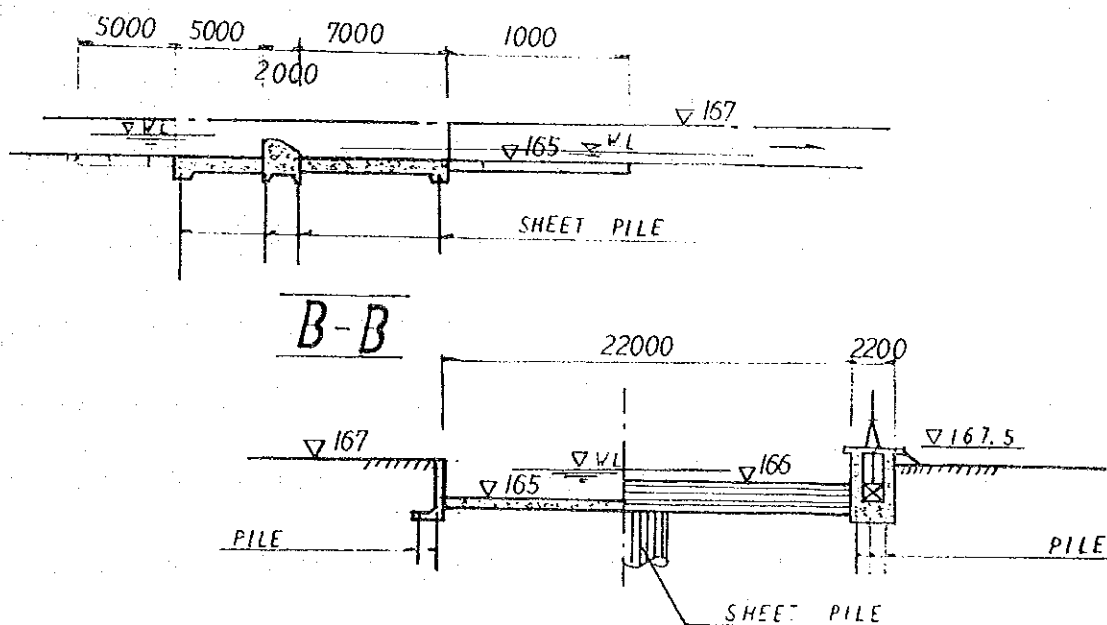
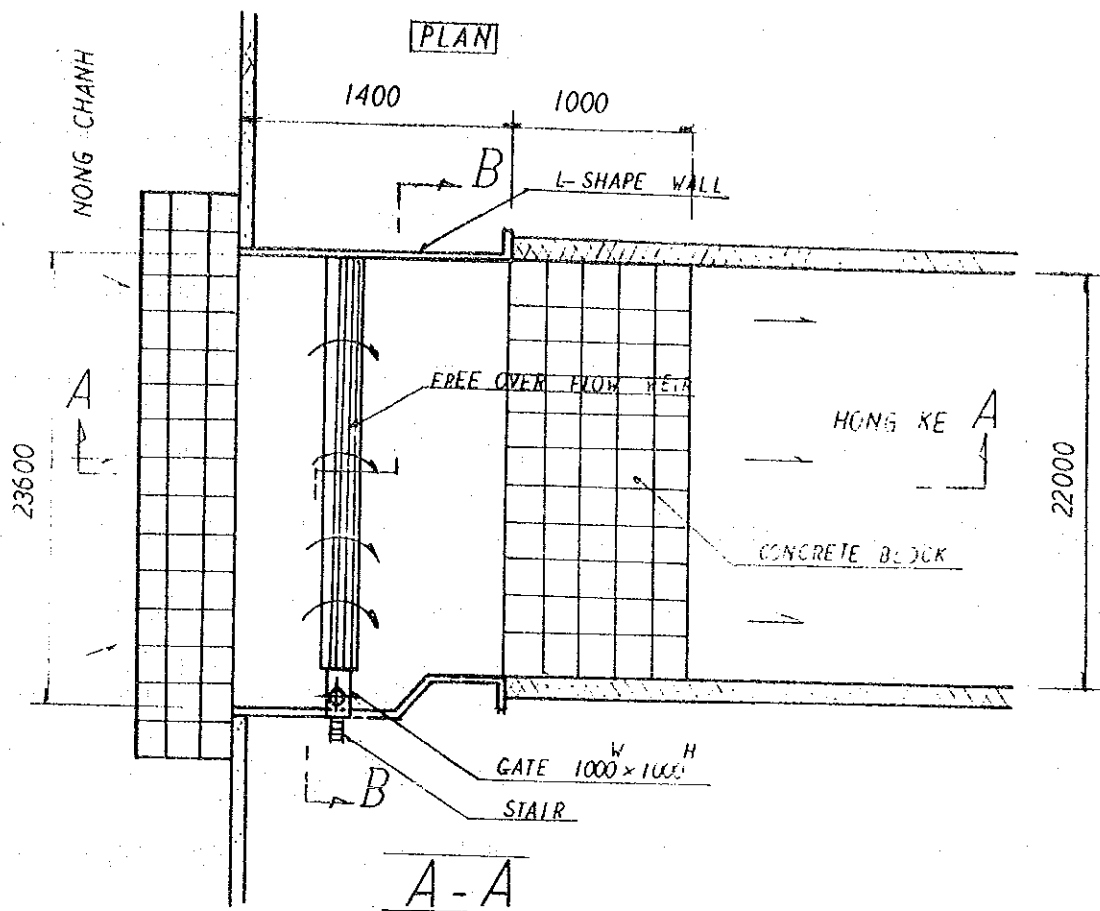


Fig. 6.5 Facility Alternatives for Weir and Gate

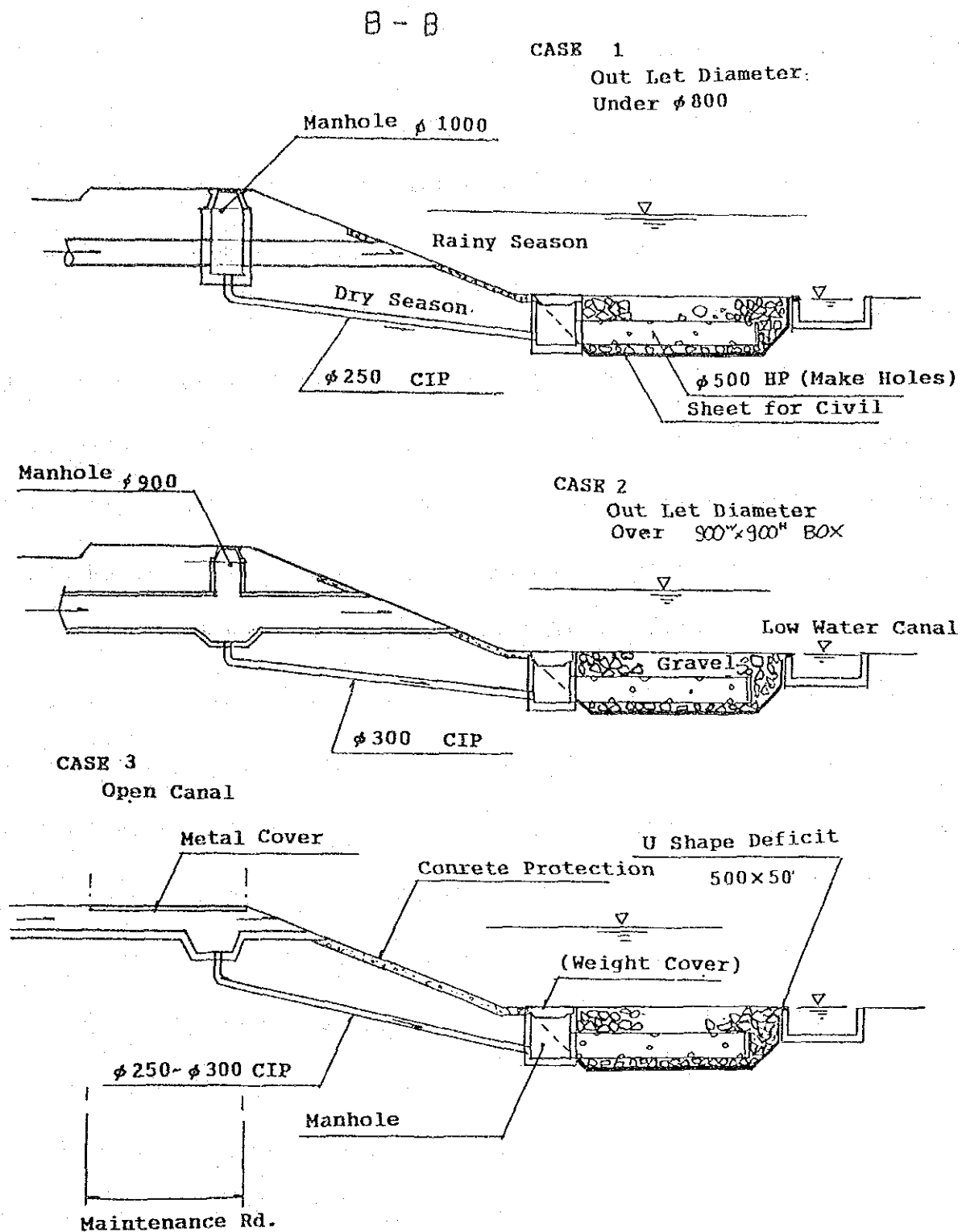
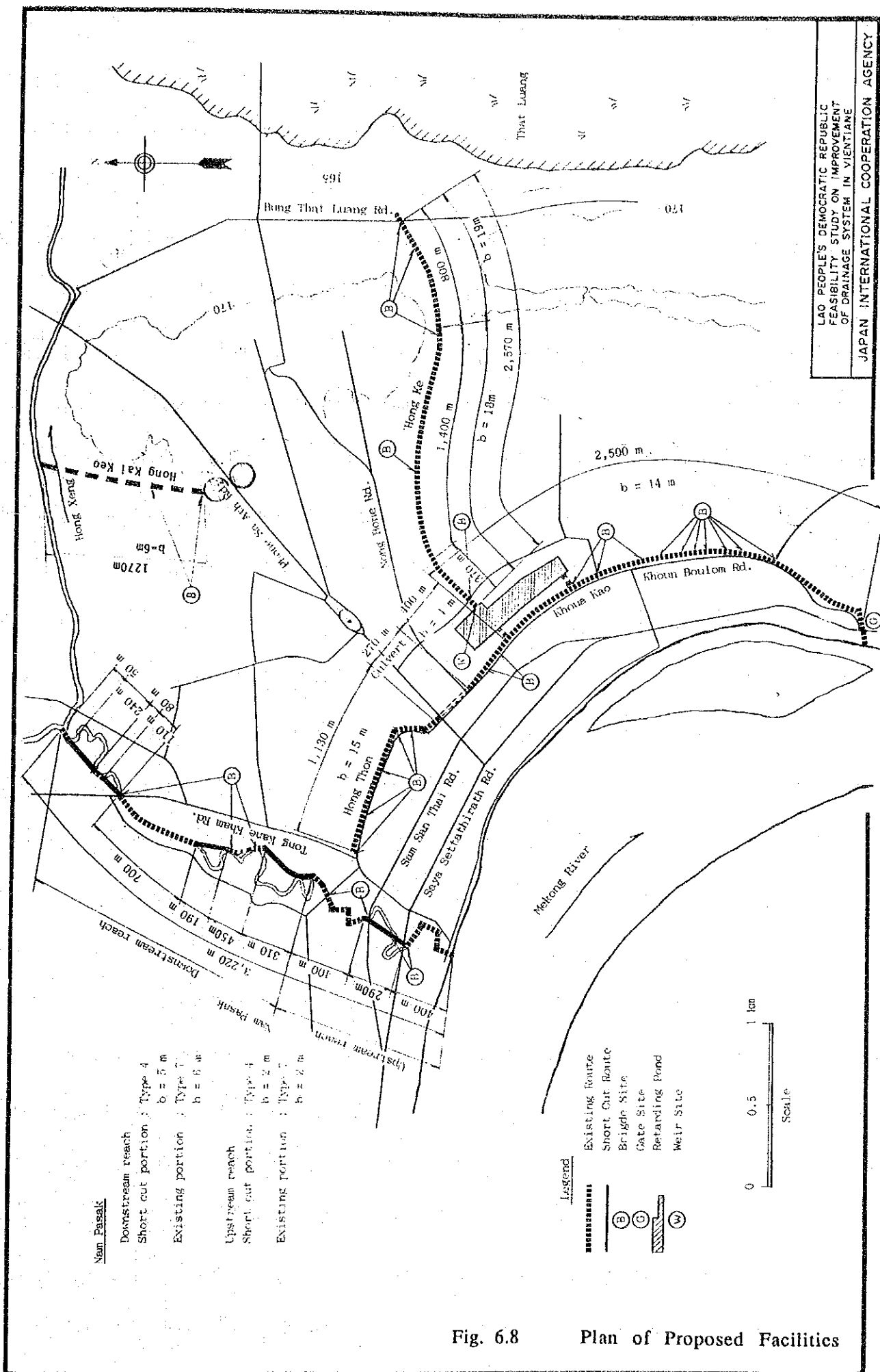


Fig. 6.6 Typical Section of Box and Pipe Culverts



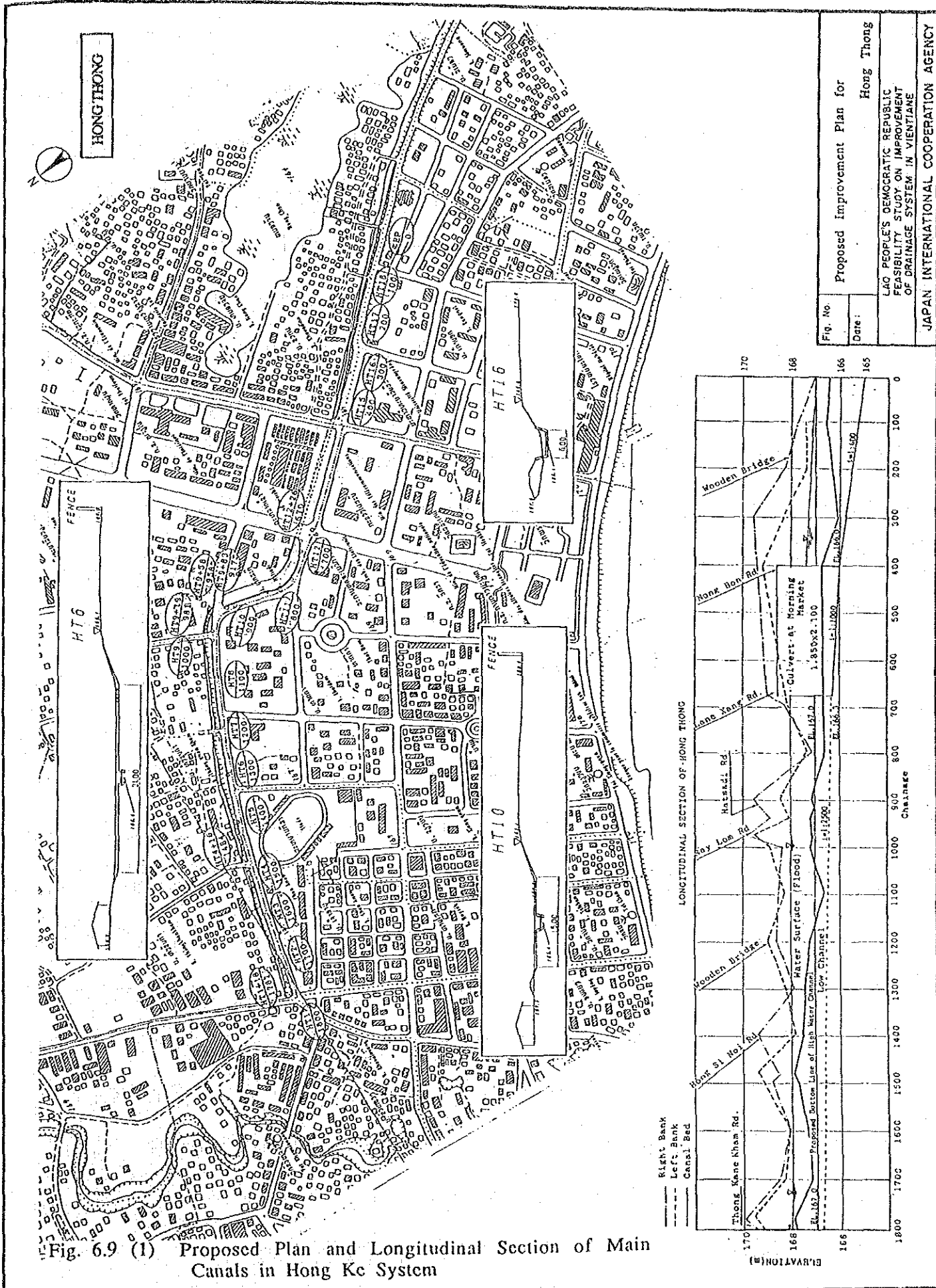
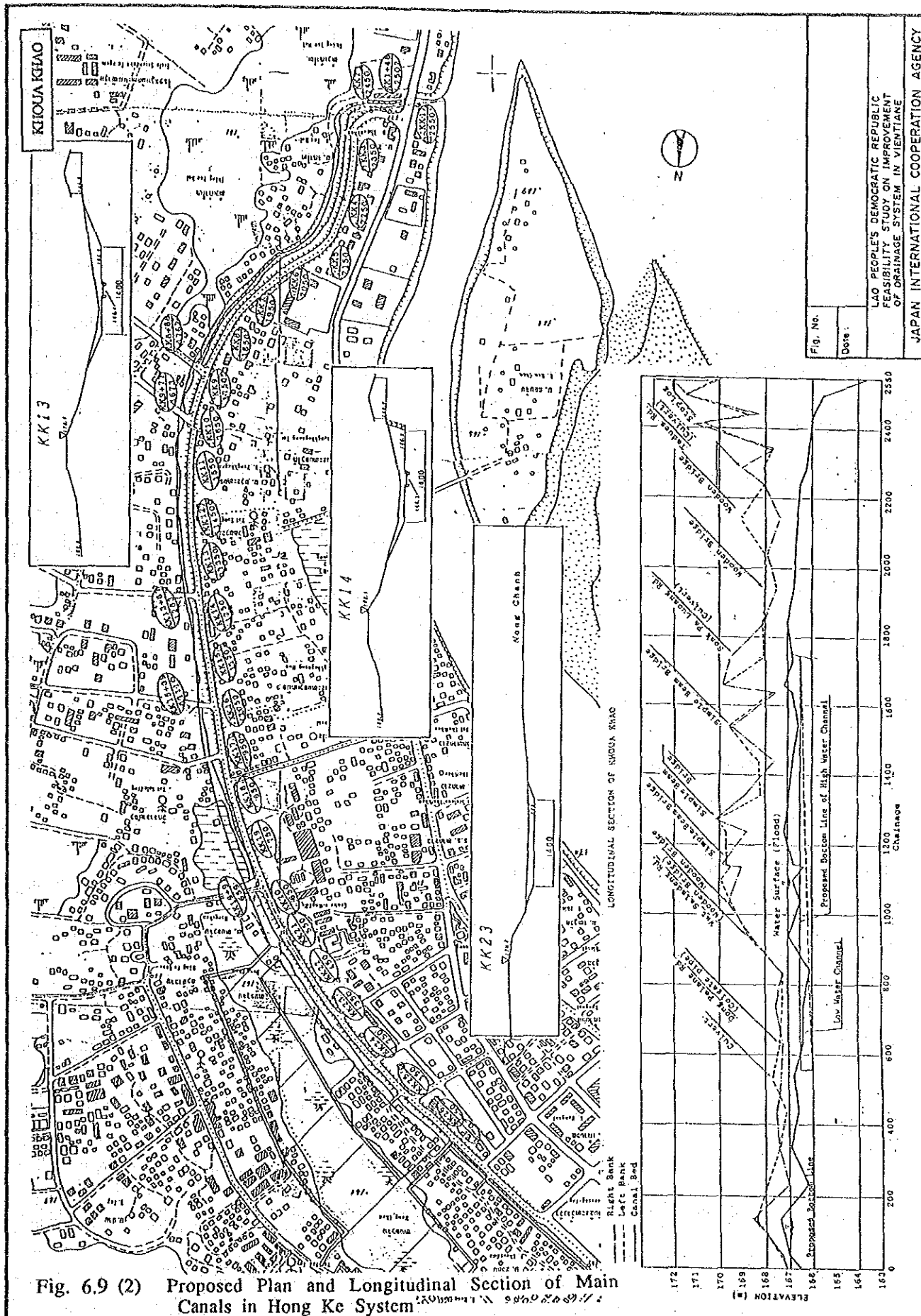
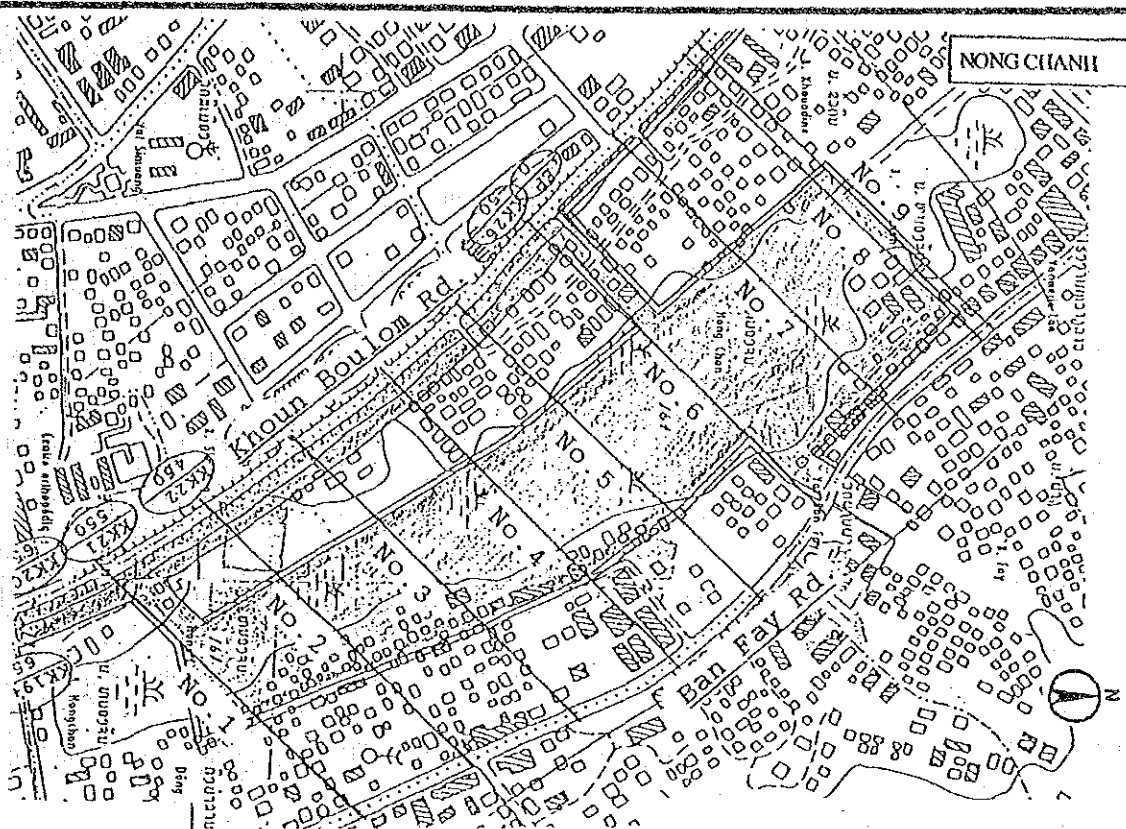


Fig. No.	Proposed Improvement Plan for		Hong Thong
Date :			
LAO PEOPLE'S DEMOCRATIC REPUBLIC			
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OF DRAINAGE SYSTEM IN VIENTIANE			
JAPAN INTERNATIONAL COOPERATION AGENCY			





Cross Section of Nong Chanii Retarding Pond

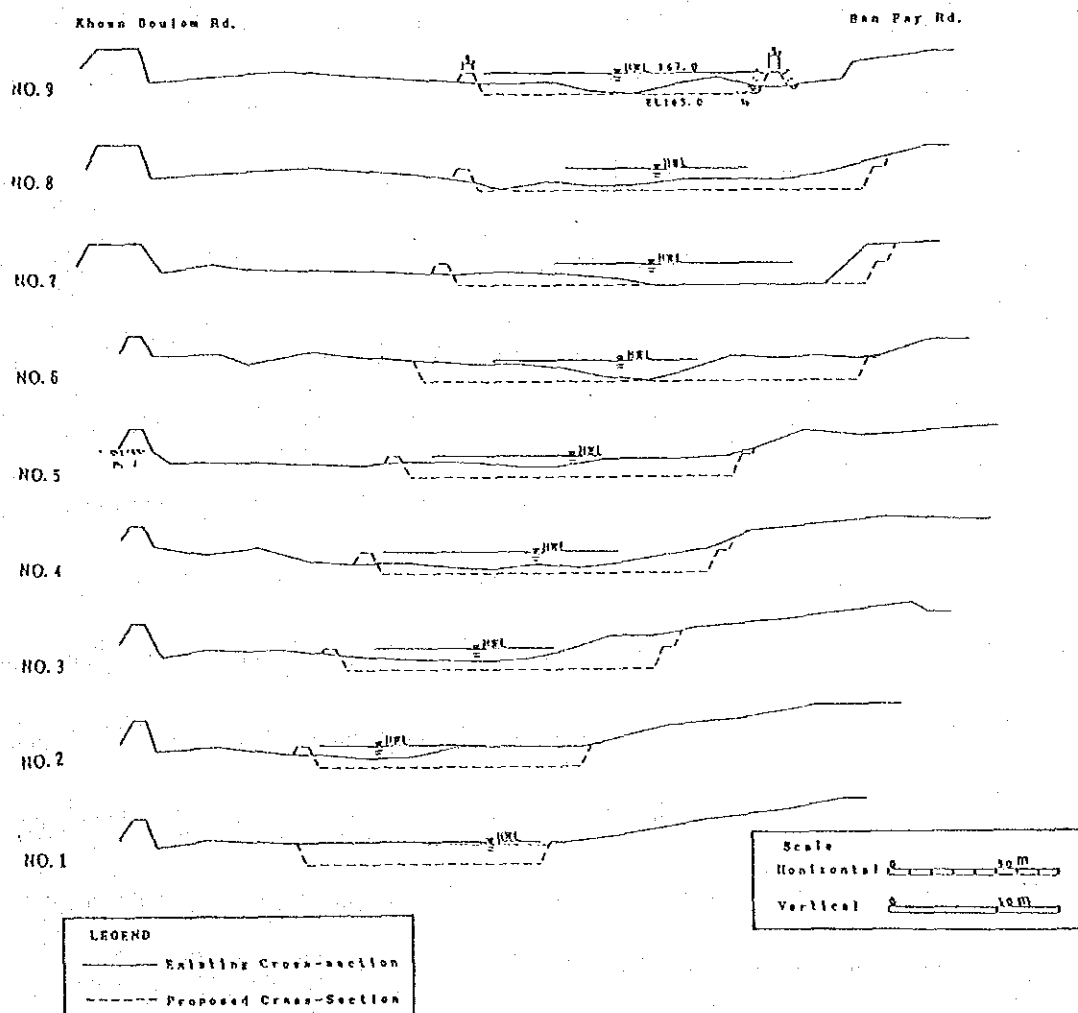


Fig. 6.9 (3) Proposed Plan and Longitudinal Section of Main Canals in Hong Ke System

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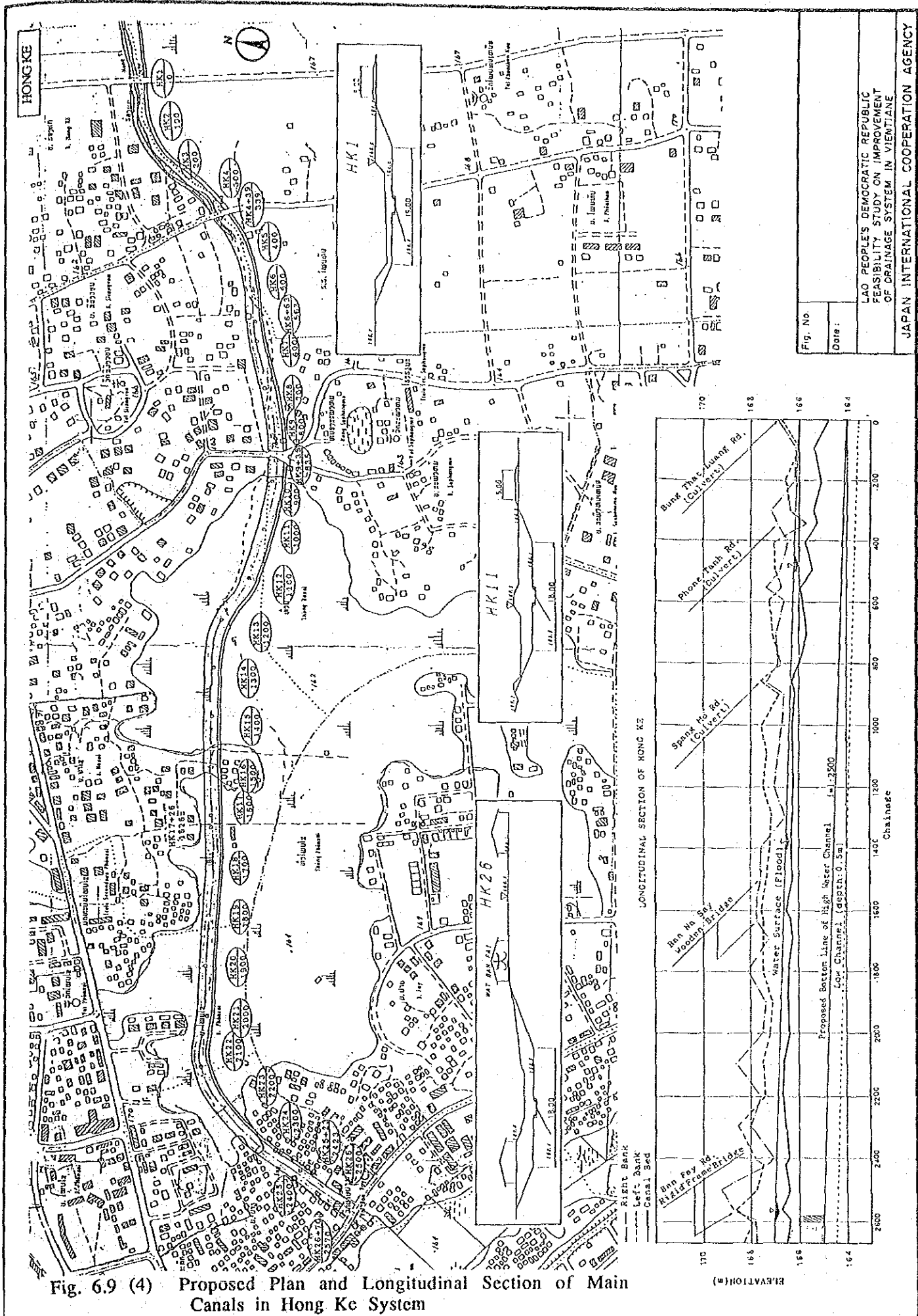
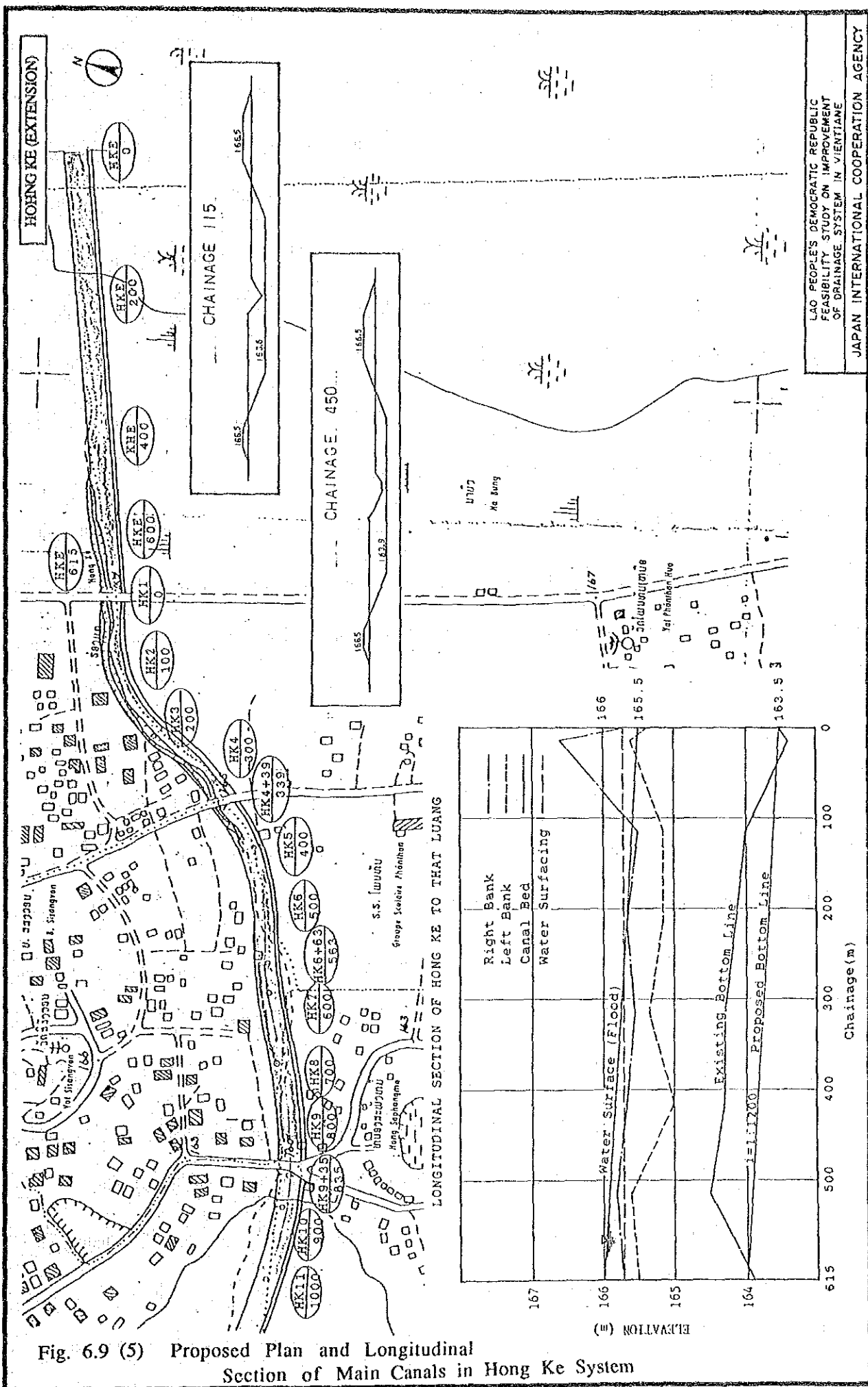


Fig. 6.9 (4) Proposed Plan and Longitudinal Section of Main Canals in Hong Ke System



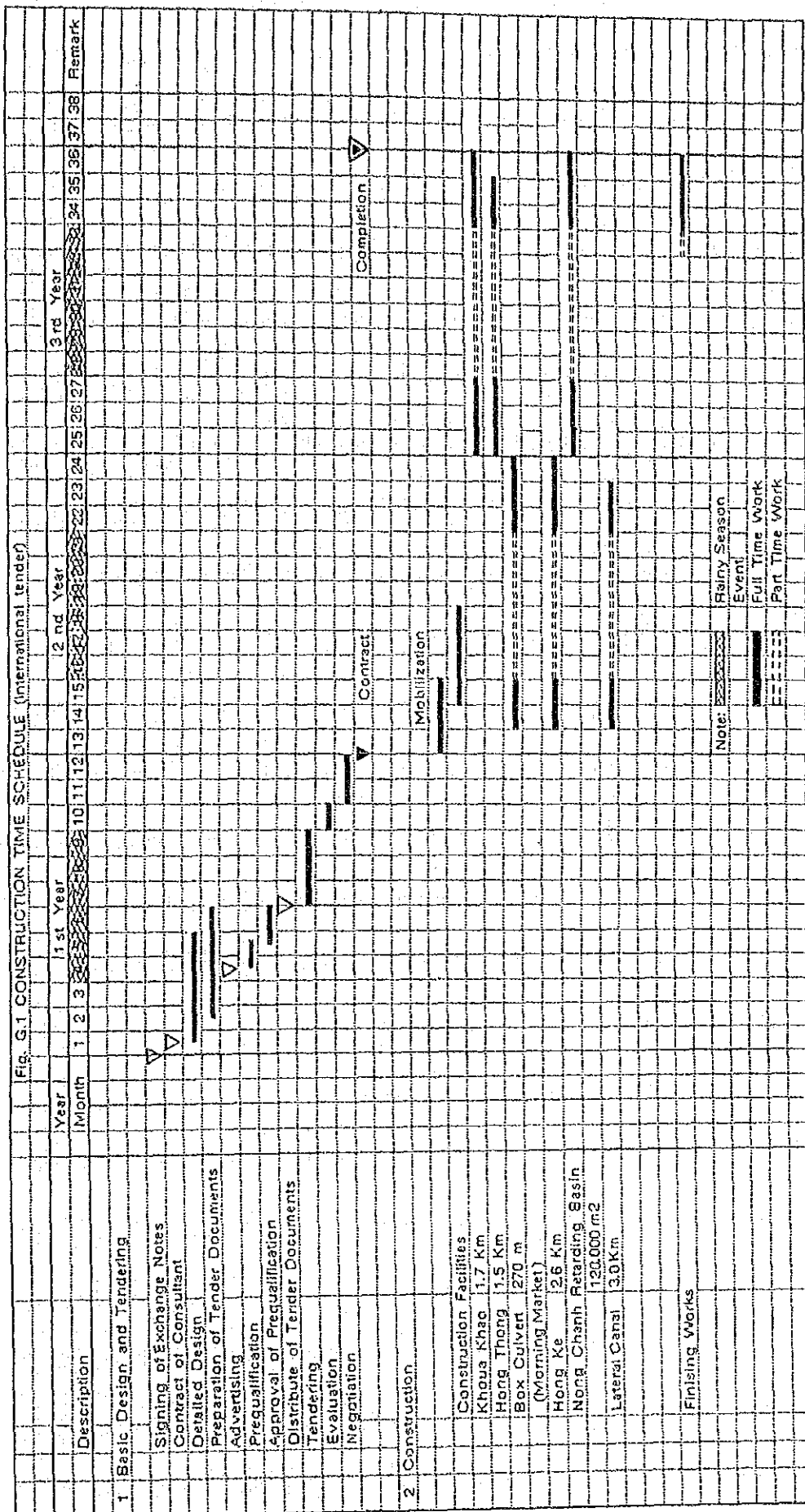


Fig. 6.10 Construction Time Schedule for Hong Ke System

